THE OLDER PATIENT

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BY TWENTY-ONE AUTHORS

Edited by

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Contents

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Preface

For many years I have been interested in the subject of aging, and this interest has increased as I have myself gained first hand knowledge of the older person s viewpoint Encouraged by my colleagues I have planned this book not to serve as a textbook on the practice of medicine but to complement such works The combined efforts of faculty members from the Bowman Gray School of Medicine and other medical schools have gone into the preparation of a volume that is intended to be of use to the internist and the general practitioner in caring for their older patients It deals not only with the principal physical ailments of elderly people, emphasizing the diagnostic and therapeutic aspects, but also with their socioeconomic and emotional problems We hope this book will aid all physicians and particularly family doctors, in helping their older patients make the necessary adjustments to age

Although every effort has been made to avoid unnecessary duplication some repetition is almost essential in a book with so many overlapping subjects Originally a chapter on allergy was included in the outline As the book evolved however, it became evident that such a section would be superfluous, since the diagnostic and therapeutic principles of allergy are virtually the same for all ages Manifestations of allergy are discussed in the chapters on the pulmonary system the skin the eyes and the nose and throat

With profound gratitude I acknowledge the cooperation of the contributing authors nearly all of whom are valued friends as well as colleagues

I appreciate the patience and cooperation of Paul B Hoeber and his staff Especial thanks are due Mrs Eunice Stevens for going beyond the call of duty in giving advice, encouragement, and sympathetic understanding throughout the past two years

Miss Nell Benton, chief librarian of the Bowman Gray School of Medicine, deserves great credit for the meticulous care with which she checked the references used in this book. A final tribute goes to Mrs. Edward Jackson—for years my secretary, editorial adviser, and severest critic. She has edited every chapter, including my own (indeed, especially my own), with ruthless disregard for its author's parental pride, but with the determination that the organization of each, as well as the meaning of every sentence and phrase, would be as clear as she could possibly make it.

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Winston-Salem

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The aging process proceeds at a much slower rate in mature years than in childhood This distinction is particularly notable in the brain which may actually improve with use until the sixth or even the seventh decade is reached

One s occupation may make considerable difference in his aware ness of approaching age The combat flier is at his best before he is old enough to vote and has passed his greatest usefulness by the mid twenties Athletes are recruited from the younger generation A prize fighter a tennis player or a football player is considered a veteran a

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The late Dr Carl Weller reminded us that man is one of the long lived animals that there is a definite life pattern for every species including man and that Alteration of the pattern is an unbelievably slow process" Since the life pattern includes a maxi mum life span it is natural to wonder how this statement can be reconciled with the fact that man s life span in this country has increased from 47 years in 1900 to almost 70 today The answer is that the increase is in the *average* rather than the *maximum* life span and has been achieved largely by the conquest of infectious diseases such as *pneumonia* typhoid fever dysentery diphtheria and tuberculosis Advances in *surgery* are also a contributory fac tor In spite of the remarkable improvement in man s average life expectancy the *maximum* life span has not been materially altered and probably will remain at 90 *years with* considerable individual variation for the *next* few *centuries at least* While man s life expectancy at birth has almost *doubled in the* past century his life expectancy at the age of 60 has increased by only one year (Fig 1 1)

("word, thought, or science") Webster defines it as 'The scientific study of the phenomena of old age"

At least three medical journals are devoted entirely to the problems of old age *The Journal of the American Geriatrics Society*, published in Baltimore by Williams & Wilkins, *Geriatrics*, published in Minneapolis by Lancet Publications, and the *Journal of Gerontology*, published quarterly by the Gerontological Society in St Louis

A National Conference on Aging, sponsored by the Federal Security Agency, was held in Washington in August, 1950, and the proceedings of the eleven sections involved were published under the title *Man and His Years* * The national conference was followed by many state conferences, and in many states permanent committees have been set up to continue the study

In 1955 the American Medical Association recognized the medical importance of our aging population by appointing a committee which was first called the Committee on Geriatrics At their first meeting, however, the members of the committee voted to recommend that the name be changed to the more comprehensive title Committee on Aging'

In August, 1957, the United States Public Health Service announced a grant of $300,000 a year for five years to Duke University, for the development of a regional center to study the problems of old age The medical research will be supplemented by studies in psychology, sociology, and economics

It is unlikely, for at least two reasons that many physicians will ever limit their practice entirely to geriatrics The first reason is that many elderly people dislike being considered old and would not care to advertise their age to the world by going to an old folks' doctor The second and more important reason is that the best time *to prepare* for old age is in the full vigor of maturity, hence the general practitioner or internist is the logical one to practice geriatrics —which, even more than pediatrics, may be considered a specialty of general practice

THE BIOLOGY OF AGING

Aging begins before birth and continues through life, at different rates for different individuals and for different parts of the body

* Health Publications Institute, Inc , Raleigh, N C

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the ability to learn depreciates very slowly if the *will* to learn is retained

ATTITUDES TOWARD AGING

The oldster's attitude toward the aging process may be resentful, resigned, or realistic The first two attitudes are hardest to deal with The *resentful* patient is apt to be immature in spite of his years Often he has been spoiled in childhood, accustomed to getting what he wanted by temper tantrums Later, as a parent and spouse, he—or often she—has achieved the same aim by the technique of domineering or of clinging Such individuals need understanding and a certain amount of sympathy, but not the sort of sympathy that makes them a prey to self pity and encourages their childish resentment against life

The *resigned* oldster makes no effort to keep up with current events, or to contribute his best efforts to worthy causes He is prone to use his age as an excuse to decline invitations to participate in social or community affairs He is quite willing to accept financial support as a debt owed him by the government or his children [illegible] useful to do,

[illegible] realistic person accepts aging as a natural phenomenon, and looks for the good *in it as* well as for the bad He learns, without adopting a "Pollyanna" attitude (familiar to the older generation), that old age has its compensations.

THE OLDSTER AND HIS DOCTOR

The doctor who *deals* with many older patients will learn to recognize their reactions to age, and will often be [illegible]

[illegible] His sympathy [illegible] be of the practical sort that does not expend its force in pitying the patient, but *looks for* means to relieve his doubts and fears He will need, to use a modern term, empathy as well as sympathy

His sincerity should be so evident that he will not need to pro claim it with a trumpet The oldster instinctively senses the doctor's

Dr Weller *divides* the aging process into four components (1) nutrition and metabolism, (2) motility, (3) reproductive power, and (4) mental and spiritual development

The need for nutrition is greatest in infancy, when growth and development are most rapid It declines rapidly to about 20, remains nearly constant until about 70, then gradually falls until the end of life

Motility (muscular power and co ordination) is at its lowest level at birth, rises rapidly until the third decade, then declines gradually during the rest of life Athletes usually *reach their peak of motor* activity and control between 20 and 30

The reproductive function, lacking in the infant and young child, reaches its peak in the middle twenties, then declines in

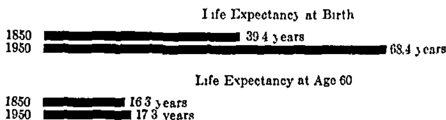


FIG 1-1 Life expectancy at birth and at 60 years of age These data are from the Statistical Department of the Metropolitan Life Insurance Company, New York (From Weinberg M 1957)

females until it ceases with the menopause, usually about the age of 45 This pattern enables the mother to bear her children after she should be mature enough to guide them, and ensures that she will live long enough—barring accident or disease— to care for her children during the years when they need her most Apparently Nature does not consider the father's role in providing for his chil dren as particularly *important, since men are capable of procreation* until an advanced age

The pattern of cerebral (or mental) function and spiritual development differs widely from the other three components of the aging process It rises rapidly from the first year to the third decade, then continues to ascend more gradually for another *20 to 35* years Between 50 and 65 this function begins to decline at different rates *for different individuals* Scientific tests have proved that a person is capable of learning until he reaches the age of senility, and that

the ability to learn depreciates very slowly if the *will* to learn is retained

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The *resigned* oldster makes no effort to keep up with current events, or to contribute his best efforts to worthy causes. He is prone to use his age as an excuse to decline invitations to participate in social or community affairs. He is quite willing to accept financial support as a debt owed him by the government or his children. Such people need to be encouraged to find something useful to do, and to maintain an interest in living.

The *realistic* person accepts aging as a natural phenomenon, and looks for the good in it as well as for the bad. He learns, without adopting a "Pollyanna" attitude (familiar to the older generation), that old age has its compensations.

THE OLDSTER AND HIS DOCTOR

The doctor who deals with many older patients will learn to recognize their reactions to age, and will often be able to help them develop the right attitude. In order to win their confidence, he will need to be sympathetic, sincere, and sensible. His sympathy should be of the practical sort that does not expend its force in pitying the patient, but looks for means to relieve his doubts and fears. He will need, to use a *modern* term, empathy as well as sympathy.

His sincerity should be so evident that he will not need to proclaim it with a trumpet. The oldster instinctively senses the doctor's

attitude If it be patronizing or impatient, he will almost certainly withdraw into his shell It is necessary to make him feel that, for the time, he has the doctor's undivided attention

The older patient also wants his doctor to be sensible in discussing his problems, whether they be physical, mental, or even *spiritual He will resent evasive answers or sugar-coated reassur*ance that all is well, when he knows that all is *not* well The average intelligent oldster appreciates a clear explanation of such conditions as hypertrophic arthritis and angina pectoris, or even of a small cerebral thrombosis It is important, however, for the doctor to select his words with care, avoiding such dread terms as "hardened arteries," "cancer," and "stroke"

The doctor should himself look for the good things about maturity and help the oldster to appreciate them Among these are the relative rarity of rheumatoid arthritis or rheumatic fever, freedom from migraine, better resistance to infectious diseases, and, for women, release from the nuisance of menstruation

In medical practice at its best, no one factor is more important than the proper relation between doctor and patient This factor *assumes particular significance in dealing with older patients* So much of pediatric practice consists of giving routine immunizations, recording weights and measurements, and prescribing formulas for various ages that a well-trained nurse can take over a great many of the pediatrician's duties The doctor can usually stay in the youngster's good graces by giving him a lollipop or a bright piece of cardboard after the nurse has done the dirty work of puncturing his skin

The oldster, however, is not so easily managed The years have taught him caution in bestowing his confidence, and his diseases are apt to be of a chronic or recurrent nature A satisfactory relation with his doctor is most important to his well-being and peace of mind Such a relation is most often one that has developed over many years The advice of a doctor who is himself well matured is often more acceptable to the elderly patient than that of a younger man It is frequently true, however, that a young doctor who really likes people—and no man who does not like people should be a family doctor or an internist—can win the confidence and even the affection of his older as well as his younger patients Whether a doctor be young or old, he will need special reserves of

patience and equanimity in dealing with many of his elderly patients.

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The subject of age changes in the skin has been recently reviewed by Andrew (1955a) While changes in the dermis, and particularly in its connective tissue fibers have been studied by a number of investigators and had been described even before the beginning of the present century (Unna, 1896) the present state of knowledge about such changes is not very complete Several investigators however including Ejiri (1937) Dick (1947) and Ma and Cowdry (1950) have found a degeneration of elastic fibers

While the general question of elasticity of the skin is a complicated one and it is undoubtedly true that we should not expect to be able to tie it too closely with the morphologic state of the elastic connective tissue, the simple fact is of course, that skin does lose some of its elasticity with advancing age If one lifts up a fold of skin on the dorsum of the hand and then releases it, the skin of a young person will return promptly to its original position while the skin of an older person will take some time to return to its place Studies on the physical property of elasticity of skin have been made on necropsy specimens (Bonniger, 1905) biopsy specimens (Evans Cowdry and Nielson 1943) and on the intact skin of living persons (Kirk and Kvorning 1949) By all these methods a decrease has been demonstrated There is interesting evidence that localized massage of the skin of aged women with estrogen oil leads to some

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CHAPTER 2

Anatomic Changes with Age

WARREN ANDREW

By the term "anatomic changes" in this chapter I refer to alterations in structure, whether of a type visible to the naked eye, or microscopic, or even submicroscopic (visible through the electron microscope).

One would expect that the general picture of aging would long since have been well defined. Millions of human beings in all age groups are, as it were, "available" for observations as living specimens, while deaths are frequent enough to furnish vast numbers of autopsy records. Surprisingly enough, however, it is difficult to make generalizations in this field and point to structural changes that are common in all old persons or can be disengaged from the "thousand ills" to which flesh is heir.

In spite of the advances in radiology that permit us to see the framework of the body and many of its organs in the living state, and in spite of the development of the phase microscope and other methods for studying living cells and tissues, the chief material for anatomic study remains the dead body and the prepared sections of tissues that have been "killed" by fixation.

Our present picture of the anatomic changes with age is probably very incomplete, and at least some of the alterations attributed to age will be found later to be disease conditions of widespread occurrence among older persons.

THE SKIN AND SUBCUTANEOUS TISSUES

The skin is one of man's most conspicuous features, and has long been used, not only in medicine but in many other fields, to dis-

tinguish the appearance of a youthful from that of an old person The two chief layers of the skin are unlike in structure, the surface one or epidermis being a stratified squamous epithelium, while the layer underlying it, the dermis, is made up of connective tissue The latter has in it all the vascular supply for the former, since epidermis does not contain blood vessels, but depends upon tissue fluid passing through vessel walls into connective tissue and so to epithelial cells The dermis, of course, also contains the nerve fibers, which pass to sensory endings in the epidermis Thus, changes in either layer undoubtedly affect the other

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The epidermis, at least in many regions of the body, shows marked changes in old age This fact seems rather surprising at first thought, since the epidermis represents an epithelial layer, the cells of which are constantly being pushed toward the surface,





FIG 2 1 Abdominal skin of young and old individuals Section cut at 6 μ Masson's stain (× 540) (*Top*) Eighteen year old female Rete pegs are prominent In the three dimensional aspect these form a pattern of ridges (*Bottom*) Seventy six year old female Rete pegs are absent

dying or being transformed, and being replaced by "younger" cells from below. Nevertheless, taking the epidermis as a whole, we see in senile skin a loss of the "rete pegs" or ridges of its lower surface, and thus a "smoothing out" of the boundary line at the dermoepidermal junction (Evans, Cowdry, and Nielson, 1943, Thuringer and Cooper, 1950, Andrew, 1955a), (Fig 2-1) This seems to be accompanied by a thinning of the main portion of the epidermis

I have found both in animals and in human beings (Andrew, 1955a) more aberrant cells present in the stratum germinativum of older individuals Such cells include some with hypertrophied nucleoli, some with lobed or double nuclei, and some with a tendency to separate from neighboring cells Thuringer and Cooper (1950) have reported the curious fact that more mitotic figures are seen in the epidermis of senile human subjects than of young ones, and we have presented evidence for such a condition in the skin of the rat (Andrew and Andrew, 1956) The presence of aberrant cells and of more frequent mitotic activity may be related to the more common occurrence in old age of hyperplastic lesions such as senile keratosis (Cowdry and Andrew, 1950) and even carcinoma (Cooper, 1952)

The appendages of the skin—the hairs, nails, and cutaneous glands—are of epidermal origin Loss of pigment from the cortex of the hair shaft leads to graying or whitening of the hair, one of the conspicuous "signs" of aging, although such loss of color may be brought about also by endocrine changes or physiologic disorders that are not a part of normal aging The cutaneous glands are said to undergo atrophy in old age, and Mackinnon (1954) has shown a decrease in the number of sweat glands on the palmar aspects of the digits On the other hand, Kirk (1948) has given evidence for a progressive increase in the amount of lipid secreted by the skin on the forehead up to an advanced age

THE MUSCULAR SYSTEM

One of the conspicuous changes of old age is a gradual decrease in the strength and accuracy of muscular action, often progressing to a state of extreme feebleness How much of this seemingly muscular change is due to alterations in the nervous system and

what part is played by changes in the joints, ligaments, and tendons are questions difficult to answer. It is obvious, however, in many elderly individuals that muscle size is decreased

Since the heart itself is a muscle, although of a particular histologic type, the nature of the changes in muscle brought about by aging is a point of great significance Whether microscopic changes occur in many of the muscles, and whether some of the muscle tissue is replaced by inert tissue types, such as adipose and fibrous connective tissue, are important questions

Berg (1956), working with rats, found a high incidence of "muscular dystrophy" in the senile animals The range in age of the older animals was from 500 to 1,186 days

He pointed out the similarity of this degenerative condition to that seen in rats on a vitamin-E-deficient diet, and suggested that perhaps old rats require more vitamin E It is not yet clear how these studies may be related to the increasing weakness of muscles in the aging human being The very high incidence of muscle degeneration in these senile rats may indicate that such changes are commonly associated with the aging process, whether or not a specific vitamin deficiency is also involved

Other muscular changes, less dramatic but of much interest, have been described as phenomena of aging Bucciante and Luria (1934) made an extensive study of skeletal muscle and concluded that in senility the size of individual fibers is increased The muscles studied were those of the tongue, larynx, and uvula, the extraocular muscles, and the sternocleidomastoid They found in all the muscles studied an increase in the interstitial connective tissue, both the collagenous and the elastic type The amount of reticular tissue was not changed In the extraocular muscles there was an increase of pigment in the fibers, chiefly in the region of the nucleus

Dogliotti (1931), in studying 200 apparently normal human hearts, found an increase in the diameter of fibers up to about 50 years, then an atrophy or decrease in size He stated that elastic tissue in the ventricles increases with age, although individual variations are great The collagenous and reticular tissues of the heart do not seem to change in amount with age

Aging causes a conspicuous increase in the pigment of cardiac muscle This substance, making its first appearance even before puberty, increases throughout life and is, in general, most abundant

in senility Jayne (1950) has described this increase in a series of 135 human subjects

As yet no adequate work has been done on changes in smooth muscle with advancing age, a subject which might be of particular importance in relation to the walls of blood vessels

The relative importance of changes in the cardiac muscle per se as compared with changes in the vascular supply of the heart might be studied in animal forms where vascular change is less common than in man At the present time, it is very difficult to assess the role of the different types of changes that occur in the aging human heart

THE SKELETAL SYSTEM

The skeleton like other parts of the body, is under a number of influences nutritional endocrine and genetic With the increasing variation of these different factors among aging individuals goes an irregularity in the degree and type of skeletal change Thus while we can describe certain types of changes in the skeleton as "senile in nature we cannot expect them to occur with the uniformity and regularity of changes that occur earlier in the life span

From a study of large collections of skeletal material such as those at Western Reserve University and Washington University, it becomes apparent that gross differences exist between some of the bones of old and of young persons In the [illegible]

[illegible]

[illegible] eroded in an irregular fashion

The times of closure of the sutures *in the* skull show a large degree of variation in different individuals Some of them are not completely closed until an advanced age The sphenoparietal suture, for example generally begins to close in the fourth decade and moves steadily to about three quarters closure by 46 years but does not exhibit complete union until 65 years of age

The texture of the cranium changes from the [illegible]

ness [illegible]

ened o

30 and [illegible] more coarsely roughened

Places of muscle attachment in the temporal and occipital regions

become ridged after the age of 25 years, but no further changes seem to occur in later life

It is often stated that age causes an increase in the depth and extent of the depressions for the arachnoid villi, but no significant change has been found (Cobb, 1952) There is, however, a deepening of the grooves for the meningeal veins and a sharpening of their margins Todd (1924) found no characteristic changes in thickness of any of the bones of the vault with advancing years Cranial thickness in general showed a slight increase up to 60 years, with no change thereafter

Harris (1933) stated that the venous channels of the diploe of the skull become obliterated by bony deposits in women after the menopause, and in men during the late fifties Since these channels are not fully developed until the thirties, it appears that they serve as a kind of safety valve in middle life for the circulation in the cerebrum, since they form a communication between the venous sinuses of the dura mater and the veins outside the cranium This safety factor is lost in older persons

Halisteresis (osteomalacia) in the face and cranium, a wasting away of the calcium salts of bone, is often mentioned in relation to age, and certainly is of frequent occurrence in older persons It is difficult, however, to assess the role of vitamin lack and other nutritional deficiencies in this condition

Changes in the skull, such as the diminution in size of the mandible and its change of shape, not only change the appearance of aging individuals, but may markedly alter the classic relationships described for various organs Thus, in the cadaver of a 96 year old woman dissected in our laboratory the submandibular gland was completely out from under cover of the mandible

Bones of the skeleton other than the skull show definite changes with age The scapula (Graves, 1922) shows changes in its vascular pattern and surface texture, as well as atrophic alteration in localized areas, where the surface becomes depressed and the bone appears patchy, spotted, or 'moth-eaten' when held up to the light In senility demineralization may become severe

"Lipping," clinically called hypertrophic arthritis refers to any ligamentous ossification or new bone formation at the capsular line of a joint It is common in many of the joints of old persons but is practically nonexistent until the age of 35 years The lumbar

vertebrae are especially subject to such change This phenomenon seems to be due to a metabolic change which leads to ossific deposits in locations where they do not occur in younger persons

The density of bone in general decreases with old age, so that it tends to become light and porous, loses much of its elasticity and capacity of resistance, and is considerably more subject to fracture (Fig 2 2) This type of change occurs to a different degree in different parts of the skeleton and other factors make it difficult to tell how important the atrophic change is Thus in spite of this tendency in spite of the enlargement of sinuses, and in spite of the loss of alveolar bone associated with the edentulous condition, the skull generally *increases* in weight with advancing age

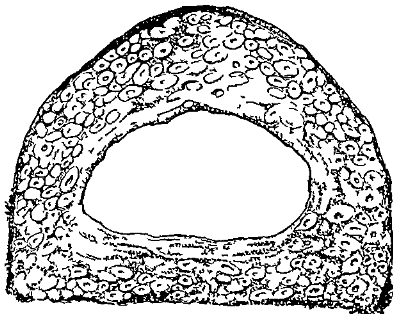
The hemopoietic functions of the marrow in the cavities of bones are gradually reduced so that in adult life the chief sites are the bodies of the vertebrae, the ribs, sternum, and innominate bones As age progresses, the red marrow of these bones tends to be replaced by yellow (fatty and inactive) marrow Fat, however, does not intrude far up the vertebral column and generally is conspicuous only in the sacrum and lower lumbar vertebrae (Piney, 1922)

From the structural aspects, changes in bone tissue with old age include an increase in diameter of the haversian canals (Fig 2-3) Nevertheless there is evidence (Amprino and Bairati, 1936) that phenomena of appositional growth and of functional adaptation persist although at a decreased rate, in old age, for even in old individuals the lacunae or spaces of resorption in compact bone show deposition of apparently new lamellae by osteocytes

Calcification of cartilage may occur in young adults, and has been shown to be widespread in costal cartilages by the early 20 s Calcification and ossification in certain individual cartilages, however are seen as phenomena of advanced age Actual bone formation frequently occurs in the cartilages of the larynx of very old persons (Noback 1949) Scanty ossification of costal cartilages in old rats has been described by Dawson and Spark (1928)

Elastic cartilage of the ear and epiglottis shows an increase in fibers throughout life, but with an accompanying decrease in the degree of elasticity (Amprino and Bairati, 1933)

Fibrous cartilage appears to undergo fewer natural regressive changes than hyaline or elastic cartilage Beyond 60 years however the intervertebral discs and the fibrocartilage of the pubic



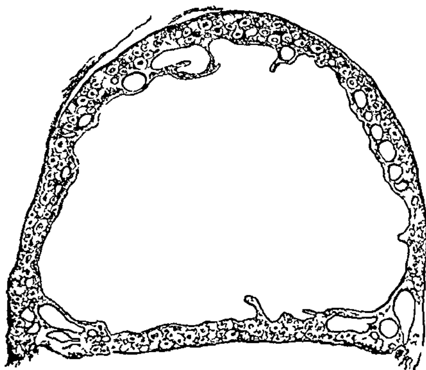


FIG 2 2 Age changes in bones (*Top*) Diaphysis of the phalanx of a woman of 39 years, cross section (*Bottom*) Diaphysis of the phalanx of a woman of 90 years cross section Marked senile osteoporosis is present (Redrawn from Amprino and Bairati 1936)



FIG 2-3 Age changes in bone tissue (*Top*) Cross section of the diaphysis of the femur from a woman 23 years. (× 26) (*Bottom*) Cross section of the diaphysis of the femur from a woman of 79 years (× 23) Dilatation of the haversian canals and the appearance of lacunae of reabsorption are prominent features. (Redrawn from Amprino and Bairati, 1936)

symphysis show degenerative alterations which include penetration by connective tissue and blood vessels, calcification, necrosis, and hemorrhage (Amprino and Bairati, 1934b)

A comprehensive study of the cartilages of the knee joint was carried out by Bennett, Waine, and Bauer (1942) Roughening of the surface, fraying, and splitting occur in the articular cartilage and the menisci Later, widespread thinning is seen and sometimes *even complete denudation of the articular surfaces, but the degree* of these changes, even in individuals of advanced age, varies considerably

From the cellular aspect, the changes in cartilage associated with old age appear to be of two different types (1) phenomena of pro*liferation and of further differentiation, in which chondrocytes can* be transformed into osteoblasts, and (2) phenomena of regression The phenomena of regression include asbestiform and albuminoid types of degeneration Asbestiform degeneration consists in the development of masses of parallel, apparently rigid fibers in the *matrix, and usually is found only at an advanced age Albuminoid* degeneration consists in the deposit of protein granules in the matrix and may be accompanied by the death of cells, fluidification of cartilage substances, and development of cavities

THE BLOOD-VASCULAR SYSTEM

It is difficult, if not impossible, to separate changes of 'normal aging' in the blood vascular system from those of a pathologic nature Vernant (1955), however, believes that some changes in *the heart can be called those of senescence rather than disease*

The general rule for the old heart is a decreased size, although arterial disease produces large hearts in a good many senile subjects There is an increase of age pigment at the poles of the nuclei of the cardiac fibers (Fig 2-4) This is probably either identical with or very similar to the pigment that *is found in* large amounts in many parts of the nervous system in old age The clarity of the striations of the cardiac fibers is diminished, particularly in the neighborhood of the nuclei The volume of the individual nuclei appears to increase, and they stain more deeply According to *Dogliotti* (1931), the amount of elastic connective tissue in the myocardium increases considerably in old age



Fig 2 4 Cardiac muscle from the apex of the left ventricle of human subjects to show the increasing amount of pigment with age *A* Twenty five year old woman *B* Fifty one year old woman *C* Seventy five year old man (After Jayne 1950)

The changes in the walls of the blood vessels are of tremendous practical importance in geriatrics. The conditions which we include within the term "arteriosclerosis" form so large a part of this field, however, and there is so much doubt as to whether this is a pathologic condition or a phenomenon of normal aging that it will be treated in a separate chapter.

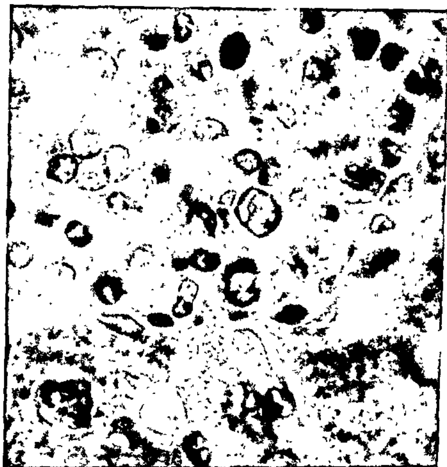


FIG. 2-5 Ectopic tissue from the periportal region of the liver of a senile male mouse (733 days of age). (× 1352) Cells of various types other than small lymphocytes are seen.

A change in the adventitia and surrounding connective tissue, both of arteries and of veins, has been described (Andrew, 1956b) as a phenomenon frequently observed in old age. This is the appearance of aggregations of "mesenchymal cells," a kind of ectopic lymphoid tissue that forms cuffs partially or wholly surrounding the vessels (Fig. 2-5). Study of the cell population of such tissue indi-

cates that it contains not only motile, infiltrating cells but stable elements such as fibroblasts There also is evidence that some of the many small lymphocytes of this tissue are differentiating into hemocytoblasts and other types of cells not found in the blood stream In addition formed structures strongly resembling Hassall s corpuscles have been found within such tissue (Fig 2 6) Other

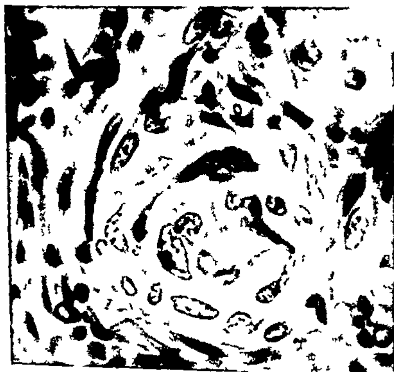


Fig 2 6 A formed structure strongly resembling a Hassall s corpuscle seen in a mass of ectopic lymphoid tissue in the kidney of a 27 month old rat (× 1352)

changes in the walls of blood vessels excluding those of frank arteriosclerosis include the appearance of vacuolated areas in the smooth muscle of the media These have been described in the arteries of the brains of senile rats (Kuhlenbeck 1954) and also in the renal vessels of such animals (Andrew and Pruett 1957) Recently in arteries from the gastrocnemius muscle of senile rats studied in collaboration with Dr Nathan Shock we have been able to observe the origin of these vacuoles within the individual smooth

muscle cells Their chemical nature is not known, although they probably are lipoidal.

The relation of these two kinds of changes, development of ectopic lymphoid tissue and vacuole formation in the media, to the functional changes in aging arteries is still obscure, but they do indicate that general changes take place in and about the vessels with advancing age—changes that may well be connected with the phenomena of arteriosclerosis

LYMPHOID TISSUE

Because of its widespread distribution in the body, its role in defense and in the production of new multipotent cells, and its known ability to respond to stimuli such as infection, lymphoid tissue would seem to be of major importance to the whole organism

Human lymph nodes show a decrease in the quantity of tissue in the cortex after puberty In late maturity and old age the lymphoid tissue frequently shows atrophy, particularly in the superficial nodes The *volume* of the node, however, is generally maintained, since adipose tissue or fibrous connective tissue replaces the lost lymphoid tissue (Denz, 1947)

The palatine, pharyngeal, and lingual tonsils show simple atrophy in old age It is rare, however, for the palatine tonsils to be completely lacking There is a slight and temporary enlargement of the palatine tonsils around the sixth decade, which seems to correspond to a similar period before puberty (Kelemen, 1943)

The chief point of interest concerning the thymus gland in old age is that, contrary to common opinion, it seldom undergoes *complete* involution It undergoes regression sooner than any other lymphoid organ but its fate appears to be bound up in some way with the development of the sex glands, as its maximum weight is found at the time of their rapid increase in size and the differentiation of the germinal tissues

Extensive study of the human spleen in relation to age has been made by Krumbhaar and Lippincott (1939) who included in their series a large number of spleens removed from persons who had met accidental deaths, so that the picture was not clouded by any known pathologic condition The maximum amount of follicular (lymphoid) tissue is seen between 16 and 20 years of age, after

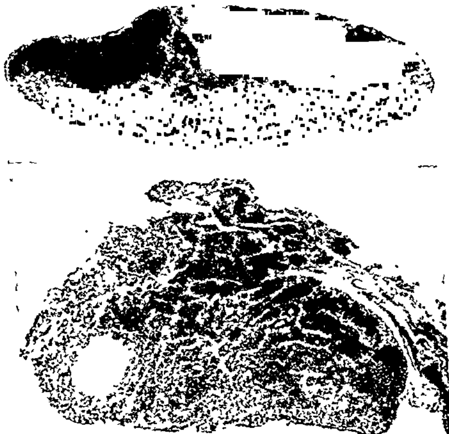


FIG 2 7 Age changes in deep cervical lymph nodes of Wistar Institute rats (*Top*) Lymph node of a 302 day old female rat Low power view In this approximately mid line section the medulla occupies about half of the total area Reaction centers are seen in the cortex (*Bottom*) Lymph node of a 1,000 day old female rat Low power view A large cavity is seen in the tissue at the far left The sinusoids of the node are wide, and distinction between cortex and medulla is difficult Reaction centers are not seen (After Andrew and Andrew 1948)

which it slowly decreases until the most advanced age Germinal (reaction) centers of the follicles are best developed between 1 and 10 years, and are generally lost in old age

Similar age changes in the spleen were found in the Wistar Institute rat (Andrew, 1946) In addition, the red pulp was observed to pass from a predominantly compact nature in young and middle-aged animals to a predominantly sinusoidal one in old

animals Studies on the spleens of 42 human subjects dying of various causes suggested that a similar change in the red pulp takes place in man

The data on the diffuse lymphatic tissue, such as that in the mucosa of the alimentary and of the respiratory tracts, are somewhat conflicting While some authors believe that it undergoes

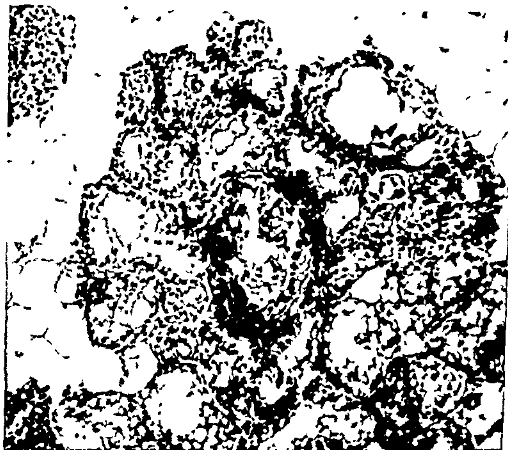


FIG 2 8 Portion of a parotid gland of a Wistar Institute albino rat in early senility, aged 700 days (× 100) A massive fatty degeneration is occurring in this area (After Andrew, 1949)

atrophic change during senescence of the blood vessels, an increase of diffuse lymphoid tissue about the vessels occurs in a number of organs Lymphoid nodules are more common in the bone marrow of old than of young persons (Williams, 1939) These nodules in the marrow apparently have no pathologic significance In the appendix the lymphoid nodules decrease with age, and as a rule are not present after the age of 75 years (Stefanelli, 1936) Since this organ

is a vestigial one, however, it would be worthwhile to have counts of follicles at different ages made in other parts of the intestinal tract

THE DIGESTIVE SYSTEM

The Alimentary Tract

In 80 per cent of subjects past 50 years the gastric mucosa shows some alterations Its thickness is diminished In the pyloric region "intestinal metaplasia" is of frequent occurrence, while the fundic glands show some dedifferentiation The lymphoid follicles are described as hyperplastic, and increased numbers of mononuclear wandering cells are found in the submucosa These age differences have been studied on autopsy material, and it would be desirable to have biopsy studies, if feasible Studies on animals also are needed.

The muscle and mucosa of the intestine, and particularly of the colon, are said to show atrophy in old age The appendix, even in

a solid,

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per cent of the older subjects a less regular outline of the mucosa This fact had been noted by Jungmann and Cosin (1948), who had found also a generally hypertonic state of the intestine in old persons

The influence of the aging process on the frankly pathologic conditions of the alimentary tract is discussed in Chapter 17 of this book.

The Accessory Glands

old

by type of change occurring in the salivary glands of aged individuals is the appearance of large, atypical cells, singly or in groups—the so called *oncocytes* Hamperl (1952) has described such cells in a number of glandular organs

The human pancreas in old age shows an accentuation of its lobulation, considerable atrophy and replacement of parenchyma

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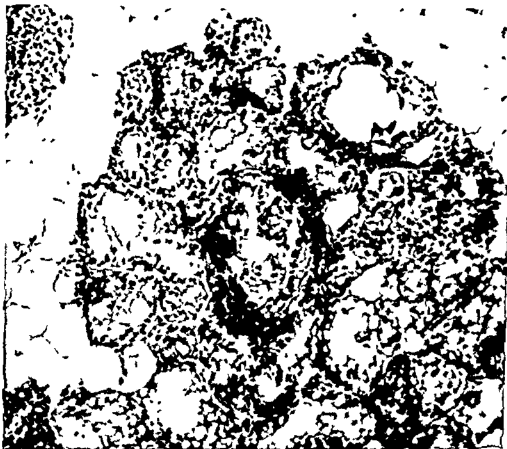


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The muscle and mucosa of the intestine, and particularly of the colon, are said to show atrophy in old age The appendix, even in the absence of preceding inflammation, is often reduced to a solid, fibrous cord, difficult to find at autopsy

Portis and King (1952), studying the small intestine by systematic radiography, found in 59 per cent of the older subjects a less regular outline of the mucosa This fact had been noted by Jungmann and Cosin (1948), who had found also a generally hypertonic state of the intestine in old persons

The influence of the aging process on the frankly pathologic conditions of the alimentary tract is discussed in Chapter 17 of this book.

The Accessory Glands

The salivary glands in man undergo varying degrees of atrophy in old age the parenchyma being replaced to a considerable extent by adipose tissue Another type of change occurring in the salivary glands of aged individuals is the appearance of large, atypical cells, singly or in groups—the so called oncocytes Hamperl (1952) has described such cells in a number of glandular organs

The human pancreas in old age shows an accentuation of its lobulation, considerable atrophy and replacement of parenchyma



Fig. 2-9. Metaplasia in an interlobular duct of the pancreas of a 77 year old man (× 540). One small area of simple columnar epithelium is seen, the remainder having become stratified squamous in type. (After Andrew, 1944.)

by adipose tissue and, in the interlobular ducts, a metaplasia of the epithelial lining (Fig. 2-9), which often changes from a simple columnar to a stratified squamous type.

In the liver, some changes occur rather consistently in old age. These, however, do not include any considerable degree of paren-

chymal degeneration unless vascular changes are marked nor is there any large amount of fibrotic change such as occurs in some glandular organs in senility

The periportal spaces in old age both in laboratory animals and in man are very often the site of a lymphocytic infiltration (Andrew Brown and Johnson 1943) Perhaps the most interesting thing about such infiltration is that the masses of cells about the

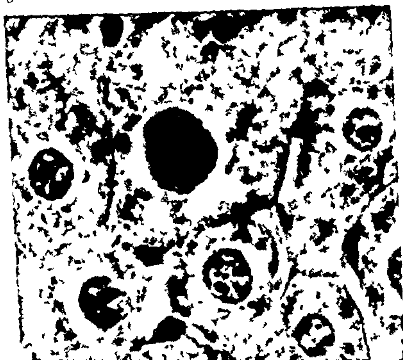


Fig 2 10 A giant nucleus in the liver of a senile female mouse (× 1[illegible]00) There are many nucleoli and the entire nucleus stains deeply The cell body is seen to be much larger than that of surrounding cells (After Andrew Brown and Johnson 1943)

blood vessels seem actually to constitute a permanent tissue containing a number of cell types not found in the blood such as fibroblasts and hemocytoblasts (Andrew 1956b) Well formed nodules may develop

Other changes are found in the hepatic cells themselves—not in the entire cell population but in scattered cells Generally a few cells in each section of a [illegible] nucleus particularly large and co[illegible] number of nucleoli (Fig 2 10)



Fig 2.9 Metaplasia in an interlobular duct of the pancreas of a 77 year old man (× 540) One small area of simple columnar epithelium is seen the remainder having become stratified squamous in type (After Andrew 1944)

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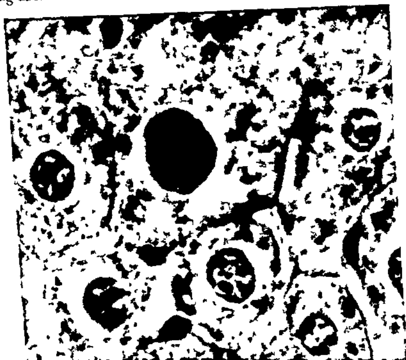


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Other changes are found in the hepatic cells themselves—not in the entire cell population, but in scattered cells Generally a few cells in each section of a lobule show hypertrophy, with the nucleus particularly large and containing several times the normal number of nucleoli (Fig 2-10)

Such large nuclei often contain inclusions *in the form of rounded* or ovoid refractive bodies

THE RESPIRATORY TRACT

I have mentioned in the discussion of skeletal changes some of the alterations that take place in the larynx in old age The pharynx and palate often show a wasting of their muscular components The palatine tonsils, while seldom completely absent, are of very small size and largely replaced by fibrous tissue In the nasal cavity and nasopharynx a dry type of chronic inflammation occurs in many old people and, perhaps as a result, metaplasia of the pseudostratified *ciliated epithelium to a stratified squamous* type is common

As was stated above, some parenchymal atrophy of the salivary glands occurs with age The general dryness of the mucosa, combined with muscular atrophy, makes difficulty in swallowing and the accidental aspiration of food common problems in old age

The stooped posture assumed by many old people alters the thorax as a whole This tendency to stoop probably is due to a combination of weakened back musculature and skeletal changes Rolleston (1932) described changes in the skeletal muscles, including loss of cross striations, deposit of large fat globules among the muscle fibers, and accumulation of brown pigment in the vicinity of the muscle nuclei *Among the skeletal elements, the intervertebral* discs are thinned and contracted In very old age the cartilage is *partly replaced by bone Necrosis and hyalinization occur, and tears* of the annulus are frequent Kountz and Alexander (1931) believe that senile emphysema is generally due *to the postural changes* produced by these changes in the discs The ribs become flattened *laterally and are less resilient* Thus the "senile chest" is longer anteriorly, flattened at the sides, and foreshortened posteriorly

The larynx and trachea seem to "settle caudally" in the aged, so that the bifurcation of the trachea may move downward several vertebrae Calcification appears to be common in the trachea much less so in the bronchi (Ashoff, 1938)

The lungs are so constantly exposed to potentially injurious influences that the recurring problem of assessing the relative roles of pathologic change and senile alteration is unusually difficult There does, however, appear to be an actual senile atrophy of the lungs

in animals and man Lungs of old subjects do not show the prompt retraction and deflation seen in those of young subjects at the autopsy table and they present less crepitation Alveolar emphysema especially in the peripheral areas is common in old age

The amount of lymphoid tissue along the respiratory tract is increased in old age in contrast with the atrophy of lymphoid tissue that occurs in many parts of the body

THE URINARY SYSTEM

Three main types of gross changes are described as occurring in the senile human kidney (1) atrophy (2) capsular thickening and adhesion and (3) production of surface irregularities Histologic changes described are (1) glomerular alterations which range from simple congestion to hyaline or fibrous transformation (2) changes in the tubules particularly distention and atrophy of the epithelium (3) vascular changes most marked in the small arteries and (4) interstitial changes primarily sclerosis of cortical connective tissue It should be emphasized that there are marked individual variations in the extent and degree of these changes in different persons In fact it is felt by some authors (Howell and Piggott 1948) that the classical senile kidney actually is the exception rather than the rule in old persons

Studies on the kidneys of Wistar Institute rats indicate that age changes in these animals are marked and consistent (Andrew and Pruett 1957) In senile rats quantities of colloid like material apparently plasma proteins are present in the tubules and may occur anywhere in the lumen from Bowman's capsule to the larger collecting tubules (Fig 2 11) Aberrant cells with greatly hypertrophied nuclei occur in various segments of the nephron They resemble the oncocytes which have been described for the salivary glands There is in these animals little fibrosis of glomeruli and only a moderate amount of change in the arterial wall Accumulations of lymphocytes and plasma cells and deposits of calcium appear in the adventitia of the arteries A peculiar but clear cut fact is an increase in size of the individual glomeruli in the senile rat over that seen in the middle-aged one The basement membrane of Bowman's capsule is thicker and more pronounced and the glomerular capillaries are wider in old animals

Such large nuclei often contain inclusions in the form of rounded or ovoid refractive bodies.

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involutionary changes in the testis are the result of an endocrine deficiency If spermatogenesis is continued into old age, however, it seems to indicate the maintenance of a good hormone level In at least half the male population in the sixties and seventies such sperm formation is present. When it has ceased and when the testis shows degenerative change in the tubules with increasing fibrosis, there remains the question as to whether the hormone level has become inadequate or whether, because of intrinsic age changes, the target organ, the testis, now refuses to respond as formerly

The histologic changes in the testis seen most often in old age are thickening of the basement membrane of the tubules and increase of the fibrous tissue in the interstitial regions The interstitial cells themselves, the endocrine portion of the testis, apparently have been inadequately studied in relation to aging of the individual Many men remain fertile far into old age According to Farris (1950) many cases of fertility in octogenarians are known, and fertility has been demonstrated in a 94 year-old man

With the exception of the prostate gland, the male secondary sexual organs have been studied but little in relation to age The prostate shows specific histologic changes in the majority of men past 40 Nodular hyperplasia occurs so commonly that it is perhaps hardly correct to speak of it as a 'disease" The primary site of proliferation appears to be the periurethral stroma, with the epithelium of the gland becoming involved secondarily While the etiology of prostatic hypertrophy is obscure, a disturbance of the androgen estrogen balance is suspected of being the principal cause

Female

In the aging female the menopause comes as a relatively dramatic phase marking the end of the period of active cyclic growth and change in the reproductive system As follicles cease to develop, fibrotic change occurs in the stroma of the ovary The residual structures in the aged human ovary are masses of hyaline and collagenous connective tissue Yet stagnation and fibrosis are not the only aspects of the aging process, for the germinal epithelium and the epithelium of the ovarian rete tubules often exhibit prolif-

Very few studies have been made on age changes in parts of the urinary tract other than the kidney, but it seems probable that tissue elements in the walls of the urinary tract show some of the

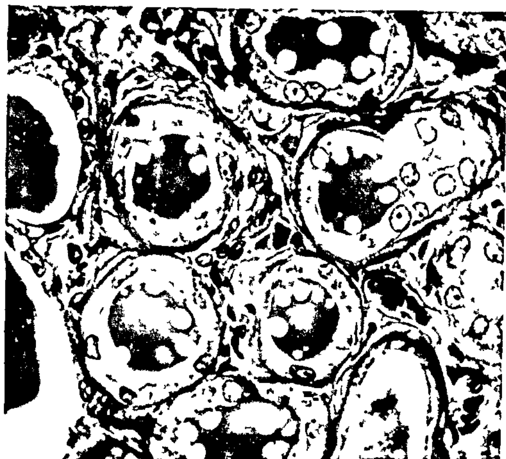


FIG. 2.11. Tubules in the medulla of the kidney of an 1,170 day old female albino rat (× 470). A dense-appearing material of colloid appearance is present in the lumina of most of the tubules. (After Andrew and Pruett, 1957.)

atrophic and fibrotic alterations so commonly associated with aging.

THE REPRODUCTIVE SYSTEM

Male

In spite of the known close relationship between the hypophysis and the gonads, there is no adequate evidence that in old age

involutionary changes in the testis are the result of an endocrine deficiency If spermatogenesis is continued into old age, however, it seems to indicate the maintenance of a good hormone level In at least half the male population in the sixties and seventies such sperm formation is present When it has ceased and when the testis shows degenerative change in the tubules with increasing fibrosis, there remains the question as to whether the hormone level has become inadequate or whether, because of intrinsic age changes, the target organ, the testis, now refuses to respond as formerly

The histologic changes in the testis seen most often in old age are thickening of the basement membrane of the tubules and increase of the fibrous tissue in the interstitial regions The interstitial cells themselves, the endocrine portion of the testis, apparently have been inadequately studied in relation to aging of the individual Many men remain fertile far into old age According to Farris (1950) many cases of fertility in octogenarians are known, and fertility has been demonstrated in a 94 year old man

With the exception of the prostate gland, the male secondary sexual organs have been studied but little in relation to age The prostate shows specific histologic changes in the majority of men past 40 Nodular hyperplasia occurs so commonly that it is perhaps hardly correct to speak of it as a "disease" The primary site of proliferation appears to be the periurethral stroma, with the epithelium of the gland becoming involved secondarily While the etiology of prostatic hypertrophy is obscure, a disturbance of the androgen estrogen balance is suspected of being the principal cause

Female

In the aging female the menopause comes as a relatively dramatic phase marking the end of the period of active cyclic growth and change in the reproductive system As follicles cease to develop, fibrotic change occurs in the stroma of the ovary The residual structures in the aged human ovary are masses of hyaline and collagenous connective tissue Yet stagnation and fibrosis are not the only aspects of the aging process, for the germinal epithelium and the epithelium of the ovarian rete tubules often exhibit prolif-

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THE ENDO

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has been shown (Payne, 1949 Jayne 1957)
primarily in the medulla (Yerkel 1947)

Only one group of workers in recent t
Paris, and Benjamin 1950) seems to have att
of senescence by means of hormones They used
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has many dangerous aspects because of our lack of
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harmful effects occurring after treatment were depress
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pancreas The authors warned *against* hasty applicat

to 45 years While it has been suggested that
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is very great that the deafness of aging
in the inner ear Various authors assign
in (1) the stria vascularis and liby
lar membrane and (3) the nerves
degeneration of cells in the cochlear
consider changes in the ganglion
proceeding from the organ of Corti
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NERVOUS SYSTEM

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THE SENSE ORGANS

The individual end organs of sensation in man are of many and varied types. With the exception of the eye and ear, only a beginning has been made in the study of their changes with age.

Most of the studies on the sensory organs of wide distribution, such as those in the skin, bone, and ligaments, have been physiologic in nature. Green and Bender (1953) have shown that the percentage of error in cutaneous tactile perception is definitely increased in the aged. They used the method of applying stimuli simultaneously to the face and the back of the hand, asking the patient, with eyes closed, to localize them. Birren (1947) concluded that the vibration sensibility of bone is diminished with age. The relationship of these functional alterations to possible anatomic changes has not been ascertained.

The threshold of taste for various substances has been shown to be raised in old age. Mochizuki (1939) carried out a study on the foliate papillae of Japanese subjects, and found a reduction in the number of taste buds with age. Smith (1942) found evidence of atrophy in the olfactory fibers of older human subjects.

For the human eye, the phenomena of cataract and of macular degeneration constitute particularly serious alterations in the aged.

The aqueous and vitreous humors have a physicochemical structure which is susceptible to a loss of equilibrium with the passage of time by mechanisms that are still obscure. Changes in the colloidal phase of these humors and in the crystalline lens lead to a more opaque condition. The arcus senilis, an opaque ring at the corneal margin, is a common sign of senility.

The special vascular arrangement of the retina leaves its outer layers—the layer of pigmented epithelium and the layer of rods and cones—without capillaries. They receive their nourishment from capillaries of the choroid coat, which appear to be particularly delicate and subject to injury in the region of the macula—a susceptibility that explains the great frequency of degeneration in this region of the eye.

The ear begins to show functional impairment at a relatively early

erative changes, becoming hyperplastic and forming papilliferous projections.

As the primary sex organ, the ovary, ceases its activity, the epithelial linings of the uterus and vagina are no longer subject to cyclic changes. These structures decrease in size; their walls undergo fibrotic changes; and there is an end to the cyclic changes of their epithelial linings. The vaginal epithelium becomes very thin, while the vaginal contents change from acid to alkaline, thus presenting less resistance to infection. The tendency of the vulva and vaginal outlet to become dry and keratinized may lead to senile vulvitis.

THE ENDOCRINE ORGANS

The cellular changes described for the human pituitary gland are slight. They include "some vacuolization" of basophils and eosinophils and slight fibrosis in old age In the fowl, however, Payne (1949) has shown very striking changes, with mitochondrial alterations leading to death of large numbers of basophils, while some degenerative changes occur in all three types of epithelial cells

In the thyroid gland the chief changes are fibrotic alterations, apparently following some parenchymal degeneration in the follicles, and the appearance of foci of hyperplastic change which lead to adenomas of various sizes

In the adrenal gland also degeneration of epithelial elements has been shown (Payne, 1949, Jayne, 1957), along with hyperplasia, primarily in the medulla (Yeakel, 1947).

Only one group of workers in recent times (Korenchevsky, Paris, and Benjamin, 1950), seems to have attempted a treatment of senescence by means of hormones They used progesterone along with estrogenic, androgenic, and thyroid hormones They conclude that, while some rejuvenative effects may be obtained, the process has many dangerous aspects because of our lack of knowledge concerning the fundamental nature of senile changes Among the harmful effects occurring after treatment were depression of thyroid activity, myocardial lesions, and the development of adenoma-like structures in the liver, adrenals, thyroid, parathyroids, thymus, and pancreas. The authors warned against "hasty application of ex-

meninges (pia mater and arachnoid) become thickened, and tend to adhere to one another and to the surface of the brain Hypertrophy of arachnoid villi may occur Deposits of calcium salts are frequent in the meninges of older persons although it is probable that in many instances these may be pathologic phenomena In the senile brain the lateral ventricles are often increased in size, and in



FIG 2 12 Cross section of the brain of a subject with senile dementia showing atrophy of the cerebral cortex with corresponding expansion of the lateral ventricles Lesser degrees of cerebral atrophy are common in the "normal" senile brain (After Andrew 1956)

cases of senile dementia this change may be marked (Fig 2 12) It apparently is due to atrophy of the brain substance

Under the microscope we find that degenerative changes predominate in the aging human nervous system These include the accumulation of inert material such as pigment and fat (Fig 2 13) a decrease in Nissl material the basophilic substance in the cytoplasm which seems to be essential to the functioning of nerve cells a change in the staining quality of the nucleus so that the "nuclear sap" is less clear and the nucleolus less distinctly stained,

age, generally by 40 to 45 years While it has been suggested that alterations in the middle ear, particularly a change in the articulation of the stapes bone at the oval window, may play some part, the weight of evidence now is very great that the deafness of aging is due primarily to change in the inner ear Various authors assign the leading role to alterations in (1) the stria vascularis and labyrinthine secretion, (2) the basilar membrane, and (3) the nerves themselves Some hold that the degeneration of cells in the cochlear ganglion is primary, others consider changes in the ganglion secondary to those in the fibers proceeding from the organ of Corti Finally, the cochlear nuclei in the brain are believed to undergo degeneration Probably some changes in all these portions of the inner ear and the nervous pathways are factors in the impairment of hearing that comes with senescence, but it is perhaps too early to attempt to designate the roles as primary or secondary Anatomically, evidence of degeneration in the cochlear ganglion is seen most clearly

THE NERVOUS SYSTEM

For two chief reasons the nervous system occupies a position of special importance in the study of the aging process (1) changes in this governing and communicating system will affect many organs in other systems, and interfere with the rather precisely set balance of function, (2) the units of the nervous system, the nerve cells or neurons, differ from most other types of cells in that they do not reproduce and hence have a life span, barring premature death, as long as that of the individual

Because of its unique character in these respects, the nervous system has long been an object for anatomic study in relation to the aging process, and many investigators have written on this subject Their contributions deal not only with the nervous system of man but also with those of the apes, dogs, guinea pigs, rats, mice and other animals, and even with the nervous systems of insects such as the honeybee and the housefly

Gross changes in the brain of man include some loss of weight with an atrophy or narrowing of the cerebral gyri and a widening and deepening of the sulci The color of the gray matter is said to be deeper in many older brains than in young ones The lepto-

and finally, the death and dissolution of some of the neurons in different parts of the nervous system, the microglia and oligodendroglia often tending to proliferate and to aid in removal of debris.



FIG. 2-1[illegible] (Approximate [illegible] two nuclei ([illegible] trinucleate [illegible]) A cell with four nuclei, shown at different foci. (From Andrew, 1956a; after Buttlar-Brentano, 1954.)

It would be wrong, however, to portray the microscopic changes with age as being of a *simple* type or uniformly present throughout the nervous system. Oskar and Cecile Vogt (1946) have contributed much to this field, and have demonstrated clearly that nerve cells in different parts of the brain seem to age, not only at different rates, but even in rather specific ways depending upon



Fig 2 13 Large pyramidal cells of layer V of the motor cortex (× 2000) (*Left*) From a 30 year old human subject No pigment is visible (*Right*) From an 81 year old subject A large mass of pigment has altered the shape of the cell (After Andrew 1955c courtesy of Professor Oskar Vogt)

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their location and biologic tendencies Particularly interesting is the observation by the Vogts and one of their disciples (Buttlar-Brentano, 1954) that in some parts of the brain, such as the supraoptic and paraventricular *nuclei of the hypothalamus, relatively* little degenerative change occurs and there seem to be, in fact, certain defensive or "reactive" changes by nerve cells which may serve to prevent degeneration Thus, many cells in these regions show a multiplication of nucleoli, *so that in later life they may be double, triple, quadruple, or even sextuple in particular cells in* the senile brain In other cells the nucleus itself may divide (Andrew, 1956a), and cells with two, three, or four nuclei have been found (Fig 2-14)

Studies on the nervous system have not been confined to the *brain and spinal cord, and age changes of various types, apparently* all degenerative in nature, have been described in the sensory and autonomic ganglia They resemble those seen in the central nervous system, with the amphicytes or capsular cells playing in the ganglia the role assumed by the microglia and oligodendroglia in the brain *and spinal cord*

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CHAPTER 3

Diagnosis in Older Patients

WINGATE M. JOHNSON

The purpose of this chapter is not to discuss the bedside diagnosis of acute conditions such as influenza, gallstone colic, or a fractured hip, but to outline the more comprehensive diagnostic survey needed for patients who come to the doctor's office for evaluation of their physical condition. Fortunately, the custom of having periodic physical check-ups, especially after middle life, is becoming more prevalent. In the course of building a stable practice the physician will save time in the long run by allowing enough time with every new patient to obtain a complete history and perform a thorough physical examination, and by recording and filing the findings in a permanent form. Such a record will prove invaluable on the patient's subsequent visits.

The history and physical examination are always fundamental to making a diagnosis, but their value increases as the patient ages. While the basic principles of history taking and physical examination apply to all mature individuals, geriatric practice calls for certain differences in emphasis and approach that will be discussed in this chapter.

THE HISTORY

In medical practice at its best, no one factor is more important than the rapport between doctor and patient. This factor is particularly significant when one is dealing with older patients. A few minutes in the first interview devoted to putting the patient at ease is time well spent. Unless the patient is too senile to give intelligent answers, it is almost always better not to have a third person pres-

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After the chief complaints have been enumerated, preferably in order of importance, they are taken up one by one Rare indeed is the patient who comes to the doctor's office with only one complaint!

It is often difficult to obtain from the patient an accurate description of his pain, but he should at least be asked whether the onset was sudden or gradual, what time of day it is felt most, what relation it bears to meals, whether it is influenced by exertion or by position, and whether it is steady or intermittent, burning, throbbing or a dull ache It often helps also to know what means the patient uses to control the pain

The time element is important in the history For example, how long has a digestive condition lasted? Is it worse before or after meals, and does the time of day play a part? Did some emotional trauma precede the onset of digestive symptoms?

Even though a detailed past history is not necessary for the diagnosis of an acute and clear cut illness such as influenza or herpes zoster, it is well to obtain such a history, including a review of the systems, at the first interview with every new patient, particularly if the patient is past middle age Every doctor eventually works out his own method of obtaining such a history and follows it almo

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deal of time There is some basis however, for a recent cartoon portraying an old man who is protesting to the doctor's secretary against filling out such a form, on the ground that it is the doctor's job to make the diagnosis The chief disadvantage of such a questionnaire is that one loses the opportunity to note the patient's reaction to questions Often a momentary hesitation, an overly enth

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The objection applies to relying entirely on the history taken by a house officer when the patient is in the hospital Experience counts more in taking the history than in any other part of the diagnostic study When the Cornell questionnaire or a house officer's history is used for the patient's record, the senior physician should at least check carefully the more important parts of the history and question the patient again about them Often he will be rewarded by valuable additional information

ent during an office interview—not even the spouse (often, *especially* not the spouse). The intimate doctor-patient relationship is best nurtured without outside interference. It is often helpful, however, to check the patient's history with members of the family, especially when he shows evidence of failing memory.

The relative position of the patient and doctor during the interview seems a minor point, but it is an important one. The patient's chair should be placed at the end of the physician's desk, facing a good light (Fig. 3-1). To have him sit on the opposite side of the desk puts a psychologic as well as a physical barrier between doctor and patient.



Fig. 3-1. Diagram showing the relative positions of doctor and patient during the office interview. A. Wrong way. B. Right way.

The history is of prime importance. The history of an elderly patient is naturally longer than that of a younger one, since there is so much more ground to cover. It is usually begun by listing the patient's chief complaints. Instead of using the word "complaints," however, it is more tactful to ask, "What is bothering you?" or, "What symptoms do you have?"

Elderly patients are even more prone to ramble in giving the history than are the younger ones. Nevertheless, they should be allowed to tell their story in their own words, although it is often necessary for the physician to guide the conversation in the proper direction by asking key questions. Often the first complaint offered is not the most important one.

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Many elaborate forms have been devised for recording the history and physical examination. Their multiplicity suggests that none of them is perfect. Many doctors use a 5 by 8 card, which may be preferred when time is at a premium and the patient's problems are comparatively simple. Others prefer the wide-open spaces of blank sheets of paper.

By the free use of abbreviations, the history can be recorded while the patient is giving the information, with no loss of time. Most doctors soon formulate their own systems of speed-writing. In my own system, for example, "M 40 yrs." or "M 1910" means married 40 years, or married in 1910. "D.G." means digestion good; "B.R." means bowels regular, "B.C." bowels constipated; "Noct. 0" that the patient does not have to void during the night; "Noct. 1" that he has to void once. If the history is to be used by anyone other than the physician recording it, it will usually be necessary for him to rewrite it or dictate it to a secretary after the patient's visit.

At the risk of being tedious and dogmatic, I will list what I consider the most important information to be obtained from the older patient.

Chief complaints (List and discuss these.)
Family history (This may be obtained at this point, or later in the interview.)
  Ages of parents at death, and causes of death.
  Number of brothers and sisters living and their state of health.
  Number of brothers and sisters dead, and causes of death.
  Hereditary diseases, particularly mental illness, in any near relatives.
  (The patient may be asked for information about grandparents, but too often this is unknown or unreliable.)
Past history
  Operations, with dates if possible.
  Serious illnesses and childhood diseases, with dates if possible.
  Menopause: date and character (stormy or otherwise).
Marital history
  Date of marriage.
  Number of children.
  State of spouse's health, if living; date and cause of death, if deceased.

Dates of subsequent marriages if any (If the patient is divorced he may be questioned about the cause for divorce here or later in the interview)

Sexual relations (The patient should be asked tactfully if they have been or still are satisfactory)

Socioeconomic history

Working hours

Living conditions whether the patient is living in his own home or with someone else whether or not his home life is happy

Review of systems

If there is anything noteworthy about the skin or about the eyes ears nose or mouth it will usually be elicited in the chief complaints and the physical examination

1 *The respiratory system* Do you have frequent colds persistent cough or wheezing?"

2 *The heart* "Are you short of breath? Do you have pain in your chest with exertion or after a heavy meal? Do your ankles swell? Do you have palpitation? Do you have to prop up in bed or sit up to breathe more easily?"

3 *The gastrointestinal system* "How is your appetite? Are your bowels regular or constipated? What laxatives do you take and how often? Is your digestion good? Do you get a balanced diet? (Often it is well to ask in detail about what is eaten at each meal or one may ask the patient if he eats enough meat green vegetables and fruit and how much milk he drinks)

4 *The genitourinary system* Do you have to get up at night to empty your bladder? Do you have any difficulty in doing so? Have you had any attacks of frequency and urgency? Has there been any vaginal bleeding or discharge?"

5 *The nervous system* "Do you have headaches if so how often? Are you dizzy? Do you have ringing in the ears? Do you have trouble in sleeping? Do you have difficulty in remembering things?

6 *The metabolism* Are you more sensitive to heat or to cold (warm natured or cold natured)? Are your hair and skin unusually dry? Has there been any recent weight change? Do you tire more easily now than formerly?"

7 *Allergies* "Have you ever had eczema hay fever asthma or nettle rash?

8 *Habits* "How much coffee or tea do you drink? How much do

you smoke? How much alcohol do you use? What time do you go to bed and what time do you get up in the morning? How much exercise do you take? What do you do for recreation?

At this point I drop my pencil ostentatiously and ask the patient if he has any cause for worry If this approach elicits no satisfactory response, I ask specific questions 'Do you have in law troubles? How do you and your wife (or your husband) get on? Are the children all happily married, and are their mates acceptable?'

By the time the patient has answered these questions, the physician should have a reasonably good idea of his personality and emotional stability, and should have succeeded in putting him completely at ease The physical examination can then be made on a patient who is relaxed and comfortable, and the findings should give a true picture of his usual condition

THE PHYSICAL EXAMINATION

The physical examination should be thorough, but if it is done systematically it need not take nearly as much time as the history should An indispensable aid to the physical examination is a set of electrically lighted diagnostic instruments, with a universal handle Dry batteries may be used to furnish current, but in the office it is much more satisfactory to depend upon the more constant illumination provided by a rheostat plugged into a wall socket The set should include, as a minimum, a transilluminator, an ophthalmoscope, an otoscope, a nasal speculum, two or three vaginal speculums of different sizes, and a sigmoidoscope

The individual doctor works out his own system for the physical examination My own usually begins with getting the patient's height and weight and, where such information seems indicated, measuring the chest on inspiration and expiration and the abdomen at the level of the umbilicus A limited chest expansion may give the clue to emphysema or spondylitis

In order to save time, and incidentally to keep the patient from talking while the pressure is being taken I place a thermometer in his mouth just before the blood pressure cuff is applied The pulse may be counted at the same time If the blood pressure is taken in a matter of fact way, without comment or concern, the reading in

the second arm—or a second reading in the same arm—will be appreciably lower in a surprising number of patients If the pressure is taken a number of times I reassure the patient that it is "playing fair" to do this and to record the lowest reading as the one most nearly accurate

The tongue mouth, teeth and throat are next inspected with the aid of a good light and usually a tongue depressor Pallor of the mucous membranes as well as of the skin may give the clue to anemia The presence of fissures in the corners of the mouth (perleche) may possibly indicate a vitamin deficiency but is more often the result of poorly fitting dentures or sagging skin The tongue may literally tell something of the patient's condition The dry red slick tongue of pernicious anemia is familiar to every physician a sore mouth and tongue may indicate the recent use of antibiotics If the tonsils are still present in older patients they are usually atrophied and seldom give trouble in fact it is often difficult to know whether or not they have been removed Occasionally however an imbedded tonsil or tonsil remnant may be a source of recurring sore throats

Inspection of the nose will usually reveal some deviation of the septum which may or may not interfere with breathing A boggy nasal mucosa may suggest an allergy Transillumination of the sinuses often reveals cloudiness of a sinus or antrum suggesting an acute or chronic infection

Examination of the eyegrounds is followed by inspection of the ears and of the neck and throat Impacted wax is not infrequently found in the ear canals and may explain a recent hearing impairment I look for pulsations in the neck vessels and palpate the thyroid gland and the cervical lymph nodes for enlargement and possible tenderness The skin is under constant inspection during the whole examination

Before having the patient undress I ask him to hold out both hands with the fingers outstretched This procedure will disclose tremors and also enlarged finger joints both distal (Heberden's nodes) and proximal The flexibility of the fingers is noted The lower extremities are then inspected for edema, varicosities or deformities and the reflexes are tested In older patients they are often hypoactive or even absent

If the patient is a man I have him strip to the waist for the

chest examination before putting him on the examining table I first outline the heart by percussion (if possible), determine the point of maximal impulse by inspection and palpation, feel for thrills, listen to the heart sounds, and note the rhythm Then the lungs are examined, front and back In examining the lungs of a man, I have found it helpful to have him straddle the seat of a chair, with his back to me This position gives the best exposure, with the muscles equally relaxed on each side Rales at the lung bases may indicate early congestive failure Emphysema is such a frequent finding in elderly patients that the importance of measuring the chest expansion with a tape measure is worth the emphasis of repetition After the patient undresses and is put on the examining table, the heart is again checked with the patient lying down

In women the chest examination is usually deferred until the patient is on the examining table The heart, lungs, and breasts are examined while she sits up, and the examination of the breasts and heart is repeated after she lies down It is hardly necessary to say that the office nurse or some female attendant should help the woman patient undress and should stay in the room during the examination

With the patient on the examining table, the axillae, elbows and inguinal regions should be inspected and palpated for enlarged lymph nodes After the abdomen has been carefully palpated, a straight leg raising test is performed An important part of the examination is palpation of the dorsalis pedis and posterior tibial arteries in each foot At the same time the color of the skin and temperature of the feet should be noted A vaginal and rectal examination in a woman and a rectal examination in a man conclude the examination unless the use of the sigmoidoscope is indicated

In the physical examination one may respect the extreme modesty of many older patients, but should not let it prevent a thorough examination Much depends upon the attitude of the examiner If he himself feels any embarrassment, the patient is likely to sense it The best course is to proceed with the examination of the breasts and pelvis in the same matter-of-fact manner that one has used in examining the nose and throat Gentleness and an unhurried approach are essential Some irrelevant light conversation may help divert the patient's attention

ACCESSORY STUDIES

Laboratory procedures that should be done as a routine part of the initial examination include a complete blood count, determination of the sedimentation rate, a urinalysis, and possibly a serologic test for syphilis. Some authorities recommend that in women a cervical smear for a Papanicolaou study should be obtained at least once a year, if reliable laboratory interpretation is available. Other tests may be indicated by the patient's history; among them, determinations of the blood urea nitrogen (BUN), blood sugar and serum cholesterol, and a protein bound iodine (PBI) or iodine uptake test. Except under certain circumstances,* the latter tests for thyroid activity are far more reliable than the basal metabolism.

Every patient past middle age should have, as a part of his initial examination, a chest film and an electrocardiogram. These need not be repeated at subsequent visits unless they are indicated by the patient's symptoms, but it is helpful to have them filed away for comparison with any films or cardiograms that might be made in the future.

While the conscientious physician never likes to order diagnostic procedures, especially expensive ones, that are not *indicated by the* patient's symptoms, there are times when additional x rays, another electrocardiogram, or some laboratory procedure may be necessary as a means of giving the patient reassurance. Patients with cancer *phobia*, for example, may have their anxiety dispelled, for a time at least, by a "therapeutic x ray examination," or by a Papanicolaou smear.

CONCLUSION

Just as it is rare for the geriatric patient to have only one complaint, it is rare for him to have only *one diagnosis*. The diagnoses—or suspected diagnoses—should be recorded in order of relative importance. In making a diagnosis, the history is far more important than the physical examination and the laboratory findings, though all should be considered. Unfortunately, it is not always possible to arrive at a definite diagnosis, even after all the necessary

* Possible sources of errors were given in *Journal of the American Medical Association* 162 1582 1956

studies have been made. The clinician must agree with Hippocrates that "Experience is fallacious and judgment difficult," but with experience there should come improvement in one's judgment, which may be called wisdom. One of the greatest gains of experience rightly used is the ability to recognize exceptions to the usual rules of conduct for disease. Oliver Wendell Holmes said, 'The young man knows the rules, but the old man knows the exceptions.'

One source of error is to be too quick to make a definite diagnosis before all the evidence is in. Being human, the doctor hates to admit a mistake, and finds it hard to take an objective view of new evidence after he has committed himself to a definite opinion. Most patients are sensible enough to understand that it is not always possible to make a diagnosis at first glance, and are willing to give the doctor time to digest the facts in the case before he renders his verdict. *Furthermore, people no longer expect their doctor to know* everything, and will respect him more rather than less if at times he will have the courage to say "I don't know."

In explaining to the patient what was found in his case and outlining his treatment, one should use the simplest language possible. The choice of words is so important that 'logotherapy" will be the topic of a section in the next chapter.

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CHAPTER 4

Treatment of the Older Patient

WINGATE M JOHNSON

The treatment of the older patient is important enough to justify a discussion of some general principles even though the therapy of specific conditions will be covered in succeeding chapters

DRUGS

Within a generation therapeutic nihilism has given way to therapeutic optimism which at times may betray the physician into overconfidence in the effectiveness and safety of the modern drugs A good rule for using the new drugs that are being introduced with bewildering rapidity is found in Pope s time honored couplet

> Be not the first by whom the new are tried
> Nor yet the last to lay the old aside

For Specific Therapy

The specific therapy of infectious diseases which will be discussed more fully in Chapter 8 is virtually the same in adult patients of any age It should be remembered that the modern "miracle drugs" are ineffective *against the viruses* * and hence should not be used to treat upper respiratory infections except in the presence of *sinusitis otitis* media or coccal pneumonia The danger of allergic reactions is always present and the longer an

* Psittacosis was once considered an exception to this rule but recently it has been reclassified as a rickettsial rather *than a viral disease* (*British Medical Journal*, 1953)

antibiotic has been in use, the greater is the possibility that the patient has become sensitized to it. We are also encountering an increasing number of organisms, especially staphylococci, which are resistant to many if not most of the antibiotics.

Although the antibiotics, when properly used, are truly wonder drugs, they should be employed only in conditions for which they are definitely indicated. I believe that one should use as much caution in prescribing a course of antibiotics as in recommending a major operation. Yow (1955) has made a good case for more frequent use of the sulfonamides, which are far cheaper and safer than the antibiotics, and in most cases just as effective.

For Symptomatic Treatment

Sedatives often have bizarre effects in older people. It is not unusual for the geriatric patient to sleep poorly after taking a barbiturate at bedtime, and to be drowsy and confused the next day. The old stand by, chloral hydrate, is usually a much more satisfactory hypnotic, and does not leave a "morning after" hangover. Its disagreeable taste may now be avoided by giving it in capsule form (0.5 Gm.).

Rauwolfia and its extract, reserpine, widely used for their hypotensive and tranquilizing effect, may cause mental confusion and depression, especially in elderly patients. The United States Public Health Service has warned against giving patients of any age more than 0.25 to 0.5 mg. of reserpine daily. As Grollman notes in Chapter 13, older patients with a systolic pressure of 180 to 200 and a diastolic pressure of 80 to 100 do not need hypotensive medication, and its use in such patients is likely to cause mental symptoms.

Other tranquilizers have come from pharmaceutical houses with bewildering rapidity. These undoubtedly may help tide many patients over stressful situations. They are too new, however, to permit critical evaluation of their long term use. There is increasing evidence that they may have undesirable side effects and may be habit forming. In older patients especially there is the danger of producing or increasing confusion or depression.

Another reason for caution in prescribing these drugs is their relative expense. Phenobarbital and amobarbital are far less costly

than the modern tranquilizers In a double blind study of the comparative effectiveness of four modern tranquilizers, amobarbital (Amytal) and a placebo, a British group (Raymond, *et al*, 1957) reported that the patients gave amobarbital the highest rating, yet it was the cheapest of the lot, not excluding the placebo

In the past bromides were often prescribed for their sedative effect, and various patent medicines sold for the relief of pain contain them in their formulas Since they can be sold without a prescription, many patients got the habit of using them regularly Their cumulative effect often aggravates the very symptoms for which they are taken, and in some patients produces mental confusion or hallucinations Fortunately, bromides are seldom prescribed now by physicians, and are less prominent among the ingredients of "headache powders," but one should still be mindful of the possibility of bromism, especially in older patients Determination of the bromide content of the blood is a relatively simple laboratory procedure, and may solve a diagnostic problem The principal treatment is to discontinue the drug and let it be eliminated from the system a process which usually takes about two weeks The use of sodium chloride to hasten the process of elimination is being abandoned as useless and possibly harmful

Older patients are apt to tolerate opiates poorly, and to require relatively smaller doses for the relief of pain Although morphine in doses of 8 to 16 mg (1/8 to 1/4 gr) is a very effective pain reliever and also has in most people a pleasant euphoric effect, it frequently produces nausea Unless a patient is known to tolerate it well, its use had best be avoided in coronary occlusion or any condition in which the stress of vomiting would be undesirable or even dangerous In such situations it is safer to give Dilaudid in doses of 2 to 4 mg (1/32 to 1/16 gr), or Demerol (meperidine) in doses of 50 to 100 mg Another undesirable side effect occasionally associated with the use of morphine (and frequently with hyoscine) is the production of restlessness, confusion, and even hallucinations Fortunately, patients who are so affected by morphine usually respond well to hyoscine (scopolamine), and those who tolerate hyoscine poorly are able to take morphine without ill effects The relief of pain by drugs as well as by nerve blocks and other surgical procedures is fully discussed by Dr Crandell in Chapter 6

antibiotic has been in use, the greater is the possibility that the patient has become sensitized to it We are also encountering an increasing number of organisms, especially staphylococci, which are resistant to many if not most of the antibiotics

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Other tranquilizers have come from pharmaceutical houses with bewildering rapidity These undoubtedly may help tide many patients over stressful situations They are too new, however, to permit critical evaluation of their long-term use There is increasing evidence that they may have undesirable side effects and may be habit-forming In older patients especially there is the danger of producing or increasing confusion or depression

Another reason for caution in prescribing these drugs is their relative expense Phenobarbital and amobarbital are far less costly

such a feeling of security that they may look upon their hospital stay as a happy experience

In treating older patients it is advisable to make some concessions to life long habits, such as wearing long handled underwear, smoking or taking laxatives Unless there is a valid objection to such habits there is no real reason for changing them When a change seems necessary, it is important to make the patient understand the reason for it and to give him all possible moral support while he is trying to alter his ways As Mark Twain has said, "Habit is not to be thrown out the window, but coaxed downstairs one step at a time"

Chief among the habits that may be injurious to older people is that of overeating or of eating too much carbohydrate food at the expense of meat and vegetables Another is the abuse of laxatives, especially mineral oil Most patients, if they cannot be educated to do without laxatives altogether, can at least be persuaded to sub-

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smoking is undoubtedly harmful Patients with either of these conditions should be strongly urged to discontinue the use of tobacco in any form It may be possible in some cases to soften the blow by suggesting the use of an alcoholic beverage once or twice a day as a substitute

LOGOTHERAPY

The choice of words used in talking to older patients is most important In the last edition of his *Care of the Aged* (1946) the late Dr Malford W Thewlis often used the term "logotherapy," coined from the Greek to describe treatment by words If one uses the right words it is possible to explain almost any illness to a patient without alarming him For example instead of telling a patient that he has hardening of the arteries one can say, "Your blood vessels are less elastic than they once were" To tell a patient that a clot has blocked one of the small vessels of his brain is far more merciful than saying bluntly, "You have had a stroke" "You have more mileage on your motor than when you cast your first vote and need something to make its stroke more effective" is less

In prescribing drugs, especially for prolonged use, one should be mindful of the expense If an opiate is to be required over a long period because of inoperable cancer, morphine is much cheaper than codeine or other substitutes

As a general rule, the older person requires smaller doses of all remedies, except possibly laxatives

DIET AND GENERAL HYGIENE

When the older patient has fever, or after he has had an operation, his diet should be light but well balanced Liquids are easier to swallow than solids, but such solid foods as scraped steak, lamb chops, chicken, tender vegetables, cooked cereals, gelatin, custard, applesauce, and ice cream are usually well tolerated Personal experience convinced me that, in our hospital, at least, selections from the so called soft or bland diet are more acceptable to the palate of a postoperative patient than the regular house diet

One of the greatest advances made recently in medical and surgical practice is early ambulation following an operation or an illness Patients who have had operations before and after early ambulation came to be the accepted practice are especially grateful for the advantages afforded by the modern method Even after a myocardial infarction it has become almost universal practice to allow the patient to use a bedside commode rather than a bedpan for a bowel movement This method really puts less strain on the heart and favors the expulsion of gas

As Dr Bradshaw points out in Chapter 7, a patient nowadays is not denied the benefit of needed surgery merely because he is no longer young Hospitals have become such popular places since the advent of prepayment plans that much of the prejudice against them has been lost, even by the older generation There are still a good many elderly people, however, who are pathetically afraid of going to a hospital for an operation or for the treatment of a severe illness Such patients, who may not have slept away from their own homes in years, need the "tender loving care" that is so often recommended for pediatric patients In most hospitals, fortunately, the members of the nursing and medical staffs accept the challenge to make such oldsters feel welcome and to give them

such a feeling of security that they may look upon their hospital stay as a happy experience

In treating older patients it is advisable to make some concessions to life long habits, such as wearing long handled underwear, smoking, or taking laxatives Unless there is a valid objection to such habits, there is no real reason for changing them When a change seems necessary, it is important to make the patient understand the reason for it and to give him all possible moral support while he is trying to alter his ways As Mark Twain has said, "Habit is not to be thrown out the window, but coaxed downstairs one step at a time

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alarming than "You have signs of congestive heart failure and need digitalis."

It is especially important to clarify the distinction between hypertrophic or degenerative arthritis and the rheumatoid variety.

One of the most debated questions in medicine is whether or not to tell a patient that he has an inoperable cancer or some other fatal disease. I agree with Dr. Walter Alvarez that it is usually best to tell the patient the truth, even though members of the family may insist that he should *not* be told. *The patient usually knows* more about his condition than he admits to the family, so that deception is practiced on both sides. It is often a great relief to have the veil of secrecy pulled aside.

The choice of words used in telling a patient that he has an incurable illness is extremely important. As a witty Scotchman once said, 'You can at least put a bathing suit on truth.' One should not shut the door completely against all hope. Cancers may often be truthfully described as progressing slowly, especially in older patients. Cirrhotic livers are now much more amenable to treatment by diet and other measures. A patient with leukemia can be told that the prognosis in pernicious anemia was once hopeless, but that Minot's discovery of the therapeutic value of liver has made it possible for a patient with this condition to live out his full life expectancy; certainly it is not inconceivable that the intensive work now being done in leukemia may soon lead to an equally rewarding discovery.

CONCLUSION

Within the past two or three decades the great advances made in the diagnosis and treatment of disease has made the practice of medicine more satisfactory than ever before, yet the public has become increasingly critical of the medical profession. One of the criticisms most often voiced is that doctors are no longer interested in the patient as an individual, but regard him simply as "a case."

The importance of treating the patient and often the whole family as well as the disease cannot be emphasized too strongly. By understanding and practicing this principle the doctor can win that confidence which is so important in treatment. Axel Munthe (1929) has well said that a doctor's secret of success is the ability

to inspire confidence and that the doctor who possesses this gift can almost raise the dead, while one who does not possess it will have to submit to the calling in of a colleague for consultation in a case of measles

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CHAPTER 5

Nutrition of the Geriatric Patient

DAVID CAYER

The significant effect of nutrition on the aging of tissue as well as on its growth and development has become increasingly apparent in recent years. Adequate nutrition throughout life provides the best chance of minimizing degenerative changes in later life. The evaluation of a geriatric patient's diet requires consideration of more than the psychologic, social, economic, and physiologic factors, and the relationship of appetite and intake to the home situation. One must determine also whether the patient has any food fixations and prejudices such as often originate in therapeutic diets imposed because of relatively benign disturbances associated with aging. In some instances, the use of antibiotics may prevent the synthesis of B complex vitamins and vitamin K by intestinal bacteria. The physiologic activity of vitamin C and vitamin K may be depressed by acetylsalicylic acid and sodium salicylate.

The diet of aging people tends to become oversimplified, and they often lose interest in diversification of meals. It therefore becomes necessary to reinstruct the patient and re-emphasize the importance of a varied diet utilizing nonprocessed or enriched foods. In order to select an adequate diet, one must have reliable information on the subject of nutrition.

In order to prevent gastric disturbances that decrease appetite, elderly patients should be instructed to maintain adequate chewing surface and to chew their food well, being careful not to wash down inadequately chewed foods with liquids. They should be cautioned not to eat when nervous or fatigued. Meals should be bland, condiments should be avoided, and fluids should not be excessively hot or cold. In many elderly patients gastric distress may

be produced by fruit juice, iron, vitamins, or yeast. In the absence of contraindications, older persons should be encouraged to take 2,000 to 3,000 cc of fluid per day. Outside interests and purposeful activity should be encouraged in order to maintain the appetite.

Requirements for calories diminish with increasing age. At the age of 65 an individual's caloric requirements are roughly 80 per cent of his needs at 25. A person's caloric expenditure is determined largely by the amount of his physical activity. A diet of 1500 to

TABLE 5-1a SUGGESTED DIETS FOR ACHIEVING AND MAINTAINING OPTIMAL WEIGHT IN GERIATRIC PATIENTS

	Calories		
	800	*1600*	*1800*
Breakfast			
Fruit or fruit juice, fresh or unsweetened	1 serving	1 serving	1 serving
Cereal	None	None	½ C. cooked *or* ¾ C dry
Whole wheat or enriched bread	1 slice	1 slice	1 slice
Eggs, boiled or poached. Do not fry	1	2	2
Butter or margarine	1 tsp	1 tsp	1 tsp
Crisp bacon	None	1 strip	1 strip
Whole milk	None	None	1 C
Lunch			
Lean meat, fish, or poultry, broiled, baked, or stewed	2 ounces	2 ounces	3 ounces
or eggs, boiled or poached	2	2	3
or cottage cheese made from skim milk	½ C	½ C	¾ C
or yellow cheese	2 slices	2 slices	3 slices
Milk	1 C skim or buttermilk	1 C whole	None
Whole wheat or enriched bread	None	1 slice	1 slice
15% or 20% vegetables*	None	None	½ C
5% and 10% vegetables*	As desired	As desired	As desired
Butter or margarine	None	1 tsp	2 tsp
Fruit, fresh or unsweetened	1 serving	1 serving	1 serving
Supper			
Lean meat, fish, or poultry, broiled, baked, or stewed	2 ounces	3 ounces	3 ounces
Milk	1 C skim or buttermilk	1 C whole	1 C whole
Whole wheat or enriched bread	None	1 slice	2 slices
15% or 20% vegetables*	None	½ C	½ C
5% and 10% vegetables*	As desired	As desired	As desired
Butter or margarine	None	1 tsp	2 tsp
Fruit, fresh or unsweetened	1 serving	1 serving	1 serving

* Select vegetables from attached lists. Cook vegetables without fat, and use vinegar or lemon juice rather than salad dressing.

CHAPTER 5

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In order to prevent gastric disturbances that decrease appetite, elderly patients should be instructed to maintain adequate chewing surface and to chew their food well, being careful not to wash down inadequately chewed foods with liquids They should be cautioned not to eat when nervous or fatigued Meals should be bland, condiments should be avoided, and fluids should not be excessively hot or cold In many elderly patients gastric distress may

TABLE 5-1c GENERAL DIRECTIONS FOR REDUCTION

1 Do not eat between meals, except as ordered
2 Eat all the foods listed for each meal, but do not eat any foods that are not ordered
3 In selecting fruits and vegetables, try to observe the following rules
a One citrus fruit or tomato every day
b One raw vegetable every day
c One green or yellow vegetable every day

and it is made from nothing but meat
7 Do not use gravies or creamed foods Do not add flour, meal or cornstarch to any food
8 Do not use dried fruits or fruits canned with sugar
9 Measure all foods carefully, using a standard measuring cup and standard measuring spoons
10 Do not use sugar or any foods made with sugar, such as candy, jelly, marmalade, syrup molasses pies cakes puddings, honey chewing gum, soft drinks, alcoholic beverages and ice cream
11 Saccharin Sucaryl or any other artificial sweetener may be used to sweeten foods
12 Do not eat fried foods or use fat (butter, margarine cream, salad oil shortening or pork in cooking
13 Weigh yourself once a week on the same day and at approximately the same time of day Keep a record of your weight every week

In all probability protein requirements decrease with age The dietary protein however, should be of high biologic availability, and special attention should be given to allowing some protein at each meal The use of

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ing from illness or previous dietary imbalance Such measures are not justified in healthy individuals beyond the age of 60, since the excess nitrogen needed for normal growth in children is neither necessary nor desirable for the metabolic processes of the aged

Many estimates concerning nutritional inadequacies in geriatric patients are based on approximations of food intake, and must be interpreted with caution In all probability, the protein and caloric needs of this group are 20 to 30 per cent lower than the "safe levels" recommended by the Food and Nutrition Board of the National Research Council (Table 5-2) While it is true that some elderly persons who are debilitated cannot

crease the daily protein

TABLE 5-1b VEGETABLE VALUES AND FRUIT PORTIONS

5% Vegetables	*15% Vegetables*	*Fruit portions*	
Asparagus	Artichokes	Apple	1 small (2 diam)
Broccoli	Lima beans	Apple juice	1/2 cup
Brussels sprouts	Oyster plant	Applesauce	1/4 cup
Cabbage	Parsnip	Apricots	2 medium
Cauliflower	Peas (fresh)	Banana	
Celery		Berries	
Cucumbers	*20% Vegetables*	Blackberries	1 cup
Eggplant	Corn	Blueberries	2/3 cup
Greens	Grits	Raspberries	1 cup
Lettuce	Macaroni	Strawberries	1 cup
Green pepper	Noodles	Cantaloupe	1/4 (6 diam)
Dill pickles	Blackeyed peas	Cherries Bing	10 large
Radishes	Potatoes Irish	Cherries Royal Anne	12 small
Rhubarb	Potatoes sweet	Figs	2 large
Sauerkraut	Rice	Fruit cocktail	1/2 cup
Snap beans	Spaghetti	Grapefruit	1/2 small
Spinach		Grapefruit juice	1/2 cup
Marrow squash		Grape juice	1/4 cup
Crooked neck squash		Grapes	12
Tomatoes		Honeydew melon	1/8 (7 diam)
		Orange	1
10% Vegetables		Orange juice	1/2 cup
Beets		Peach	1 medium
Carrots		Pear	1 small
Okra		Pineapple	1/2 cup
Onions		Pineapple juice	1/3 cup
Peas (canned)		Plums	2 medium
Pumpkin		Tangerine	1 large
Hubbard squash		Tomato juice	1 cup
Turnips		Watermelon	1 cup

1800 calories (Table 5 1) will maintain most persons beyond the age of 70 in positive protein balance In all probability, the vitamin and mineral requirements of healthy old people differ little from those of younger adults As people age, it is essential that they make each calorie carry its share of minerals, vitamins, and proteins

Older people should therefore, avoid excesses of sugar, alcohol fat, and nonenriched cereals, and should take enough exercise to permit adequate nutrition without an increase in body weight To do so may require training and self discipline Diets for older persons should be designed to provide protective foods rather than an excess intake of high calorie foods They must also be highly individualized taking into the account the patient's food likes and dislikes, eating habits customs background and economic situation

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  a One citrus fruit or tomato every day
  b One raw vegetable every day
  c One green or yellow vegetable every day
  Have one serving of liver every week
  Have one serving of fish every week

and it is made from nothing but meat
7 Do not use gravies or creamed foods Do not add flour, meal or cornstarch to any food
8 Do not use dried fruits or fruits canned with sugar
9 Measure all foods carefully using a standard measuring cup and standard measuring spoons
10 Do not use sugar or any foods made with sugar such as candy jelly marmalade, syrup molasses pies cakes puddings honey chewing gum soft drinks alcoholic beverages

13 Weigh yourself once a week on the same day and at approximately the same time Chart keep a record of your weight every week

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In all probability protein requirements decrease with age The dietary protein however, should be of high biologic availability, and special attention should be given to allowing some protein at each meal The use of high protein diets or protein supplements in elderly patients is justified only for replacement of tissue loss resulting from illness or previous dietary imbalance Such measures are not justified in healthy individuals beyond the age of 60, since the excess nitrogen needed for normal growth in children is neither necessary nor desirable for the metabolic processes of the aged

Many estimates concerning nutritional inadequacies in geriatric patients are based on approximations of food intake, and must be interpreted with caution In all probability, the protein and caloric needs of this group are 20 to 30 per cent lower than the "safe levels" recommended by the Food and Nutrition Board of the National Research Council (Table 5 2) While it is true that some elderly persons who are debilitated cannot be maintained in positive nitrogen balance on diets containing only 0 5 Gm of protein per kilogram of body weight, attempts to increase the daily protein

TABLE 5-1b VEGETABLE VALUES AND FRUIT PORTIONS

5% Vegetables	*15% Vegetables*	*Fruit portions*	
Asparagus	Artichokes	Apple	1 small (2" diam.)
Broccoli	Lima beans	Apple juice	1/2 cup
Brussels sprouts	Oyster plant	Applesauce	1/4 cup
Cabbage	Parsnip	Apricots	2 medium
Cauliflower	Peas (fresh)	Banana	
Celery		Berries	
Cucumbers	*20% Vegetables*	Blackberries	1 cup
Eggplant	Corn	Blueberries	2/3 cup
Greens	Grits	Raspberries	1 cup
Lettuce	Macaroni	Strawberries	1 cup
Green pepper	Noodles	Cantaloupe	1/4 (6" diam.)
Dill pickles	Blackeyed peas	Cherries, Bing	10 large
Radishes	Potatoes, Irish	Cherries, Royal	
Rhubarb	Potatoes, sweet	Anne	12 small
Sauerkraut	Rice	Figs	2 large
Snap beans	Spaghetti	Fruit cocktail	1/2 cup
Spinach		Grapefruit	1/2 small
Marrow squash		Grapefruit juice	1/2 cup
Crooked neck squash		Grape juice	1/4 cup
Tomatoes		Grapes	12
		Honeydew melon	1/8 (7" diam.)
10% Vegetables		Orange	1
Beets		Orange juice	1/2 cup
Carrots		Peach	1 medium
Okra		Pear	1 small
Onions		Pineapple	1/2 cup
Peas (canned)		Pineapple juice	1/3 cup
Pumpkin		Plums	2 medium
Hubbard squash		Tangerine	1 large
Turnips		Tomato juice	1 cup
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10 Do not use sugar or any foods made with sugar such as candy jelly marmalade, syrup molasses pies cakes puddings honey chewing gum soft drinks alcoholic ...
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Cabbage	Parsnip	Apricots	2 medium
Cauliflower	Peas (fresh)	Banana	
Celery		Berries	
Cucumbers	*20% Vegetables*	Blackberries	1 cup
Eggplant	Corn	Blueberries	2/3 cup
Greens	Grits	Raspberries	1 cup
Lettuce	Macaroni	Strawberries	1 cup
Green pepper	Noodles	Cantaloupe	1/4 (6" diam.)
Dill pickles	Blackeyed peas	Cherries, Bing	10 large
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intake of such persons to 1 5 Gm per kilogram have definite limitations The tendency toward increased nitrogen retention under such circumstances suggests that a high protein diet over an extended period may actually be detrimental to the elderly, particularly if renal or hepatic disease is present

A diet containing sufficient amounts of adequate protein as well as essential mineral elements is best provided by one pint of milk, whole or skim, one serving of cheese, meat, poultry, or fish daily, one to two eggs, two slices of enriched bread with two teaspoons of butter or fortified margarine, two leafy green vegetables and one yellow vegetable (these may be cooked or raw), one whole grain cereal and freshly prepared citrus fruit or fruit juice

Studies on the relationship of cholesterol and fat to blood lipids and the genesis of arteriosclerosis have encouraged the prescribing of low fat diets The evidence that such diets will significantly decrease the incidence of atherosclerosis is still not convincing, although the desirability of maintaining normal weight in elderly patients often requires a decrease in fat intake Reduction of the fat content of the diet or the substitution of plant fats (which are usually liquid at room temperature) for animal fats is occasionally associated with a lowering of serum cholesterol levels Lipid changes in the arterial intima begin in childhood, however, and serum cholesterol levels bear only a rough relationship to atherogenesis The science of nutrition has not yet advanced to the point where it is possible to determine the precise quantity and type of fat intake required for optimal health and longevity Lipotropic factors have no proved value at the present time, either in preventing atherosclerosis or in mobilizing lipid deposits already present in blood vessels

In the light of our present knowledge, emphasis should be on the prevention of excessive caloric intake in the form of either carbohydrate or fat and on the provision of adequate quantities of biologically adequate proteins, together with adequate minerals and vitamins

OBESITY

Work with experimental animals of short life span has indicated that longevity is inversely related to obesity Obesity in itself pre

TABLE 5 2 DAILY DIETARY ALLOWANCES RECOMMENDED BY THE FOOD AND NUTRITION BOARD OF THE NATIONAL RESEARCH COUNCIL (REVISED 1958)

	Age Years	*Weight Kg*	*Weight Lbs*	*Height Cm*	*Height In*	*Calories*	*Protein Gm*	*Calcium Gm*	*Iron Mg*	*Vit A I U*	*Thiamine Mg*	*Riboflavin Mg*	*Niacin mEq*	*Ascorbic acid Mg*
Men	65	70	154	175	69	2550*	70	0 8	10	5000	1 3†	1 8‡	18§	75
Women	65	58	128	163	64	1800*	58	0 8	12	5000	1 0†	1 5‡	17§	70

* Calorie allowances apply to individuals usually engaged in moderate physical activity For persons in sedentary occupations they are excessive

† Thiamine allowances are based on 0 5 mg per 1000 calories consumed, since the need for this vitamin is related to the total calories of the diet Adult intakes should not be less than 1 mg per day

‡ Riboflavin allowances for larger individuals should be increased by 0 025 mg for each kilogram above the reference body weight

§ Allowances for niacin are expressed as niacin equivalents assuming 60 mg of the amino acid tryptophane, may be converted to 1 mg of niacin in the body Adult allowances are based on requirements calculated according to body weight and calorie intake and increasing the value by 50 per cent

ducing diet is unsuccessful, an 800 calorie, high protein diet (Table 5-1) may be utilized Drugs are not necessary as a rule, although one of the amphetamine preparations such as methamphetamine in a daily dosage of 2.5 to 5 mg may be of help in patients with voracious appetites In patients having associated constipation, the use of 1 to 2 teaspoons of a bulk laxative in a full glass of hot water 30 minutes to one hour before meals often provides a feeling of satiety

The patient must be acquainted with the importance and seriousness of the problem, and must be motivated It is probably advisable to provide a maintenance vitamin preparation for patients who are following a diet markedly reduced in calories

THE IMPORTANCE OF PREOPERATIVE EVALUATION OF THE PATIENT'S NUTRITIONAL STATUS

A patient's nutritional status is often a prime factor in determining his fitness for surgical operation Patients with nutritional deficiencies particularly of protein, tolerate surgery poorly The proteins are essential to cellular function, maintenance of osmotic pressure of the blood, regulation of blood volume, and control of fluid exchange they also aid in the maintenance of acid-base balance arterial blood pressure, and the vital functions of wound healing and resistance to infection

Protein deficiency may be brought about in various ways inadequate intake blood loss, and inadequacies *of absorption and synthesis* In patients with hypoproteinemia the labile body stores are first utilized in the synthesis of hemoglobin, hence the association of anemia and hypoalbuminemia indicates a poor prognosis for surgery It should be remembered, however, that serious deficiencies in blood volume and hemoglobin may be masked by dehydration indeed considerable protein deficiency may exist in the presence of relatively normal plasma levels Such blood [illegible] ciencies [illegible]

it is esse[illegible]

All p[illegible] who have had vomiting, diarrhea, or a history of inadequate food intake prior to admission should have careful preoperative study including liver function tests for detecting and anticipating cellular liver damage, and evaluation of the non-

disposes to some diseases and complicates many others It results in an increased mortality rate, and must be considered a serious abnormality Mechanically it produces awkwardness, and it increases the likelihood of osteoarthritis and injury to the large joints It influences the development of diabetes, hypertension, heart disease, gallbladder disease, hernia, and varicosities The mortality following surgical procedures is higher in obese patients, and current concepts of the pathologic physiology of weight gain indicate that the incidence of neurosis in fat people is high

In approximately 10 per cent of patients hospitalized for chronic illness, obesity is a significant problem Frequently the physician himself is in part to blame, since many patients under prolonged medical observation in an institution are maintained on a hospital diet under conditions of restricted activity that permit considerable increase in weight Many elderly patients hospitalized for chronic conditions eat a diet consisting chiefly of fruit, coffee, cream and sugar, bread and butter, potatoes, pastry, and cereal The amount of protein in the diet is negligible

Obese patients present numerous complaints, many of which are undoubtedly related to their overweight These include central symptoms of dizziness and headache, respiratory symptoms of dyspnea, chest pain, and fatigability, gastrointestinal symptoms of gas, belching, and indigestion, and endocrine symptoms of intolerance to heat, hypertrichosis, and nervousness A high percentage of such patients have elevated systolic and diastolic blood pressures, which often respond to a reduction in weight Despite the obviously excessive caloric intake, a dietary imbalance evidenced by anemia and clinical signs of avitaminosis is not uncommon

From the practical standpoint, obesity is the result of overeating or excessive caloric intake, or both Treatment should include careful study and personality evaluation, insight into domestic problems, and analysis of the daily routine, eating habits, and motivations Although disturbances of the endocrine or central nervous system are rarely etiologic factors, they should be treated when present

The majority of patients will lose weight on a 1280 calorie diet consisting of 60 Gm of protein, 150 Gm of carbohydrate, and 50 Gm of fat Under some conditions, the protein content may be increased and the carbohydrate decreased When the standard re-

ducing diet is unsuccessful, an 800 calorie, high protein diet (Table 5-1) may be utilized Drugs are not necessary as a rule, although one of the amphetamine preparations such as methamphetamine in a daily dosage of 2 5 to 5 mg may be of help in patients with voracious appetites In patients having associated constipation, the use of 1 to 2 teaspoons of a bulk laxative in a full glass of hot water 30 minutes to one hour before meals often provides a feeling of satiety

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The majority of patients will lose weight on a 1250 calorie diet consisting of 60 Gm. of protein, 150 Gm. of carbohydrate, and 50 Gm. of fat. Under some conditions, the protein content may be increased and the carbohydrate decreased. When the standard re-

even when given rapidly When potassium depletion is marked, potassium chloride (available in ampules containing 20 and 40 mEq) may be added to the fluid given If possible, serial electrolyte determinations and electrocardiograms should be done to guide the physician

When the primary loss is electrolytes, the extracellular fluid is hypotonic The kidney excretes more water, decreasing the volume of extracellular fluid and leading to low sodium, potassium, or chloride syndromes Both electrolytes and water are required for treatment Chronic diarrhea or habitual purgation in the elderly, for example may deplete the body's store of potassium, causing disturbances in renal and myocardial function In such cases the parenteral or oral replacement of potassium together with discontinuance of laxatives, is usually all that need be done

There is little risk of producing pulmonary, peripheral, or cerebral edema by relatively large amounts of plain water given orally For the administration of parenteral fluids, an intravenous polyethylene catheter may be required Fluids can then be given at a slow constant rate so as not to overtax the circulatory system, this slow drip also decreases thirst and irritability most satisfactorily

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protein nitrogen, urinary function, and serum electrolytes When the results of such screening tests are suggestive or positive, additional determinations of liver functions should be done The findings may indicate that major surgery will be hazardous and unwise, and that the type of hepatic insufficiency present may respond to diet, transfusions, antibiotics, and vitamins

FLUID AND ELECTROLYTE DISTURBANCES

Patients with gastrointestinal disturbances may lose large amounts of water and electrolytes as a result of vomiting, diarrhea, fistulas, or intubation and suction The loss of water produces hypertonic extracellular fluid and a deficit of cellular water, often leading to oliguria, azotemia, a decreased blood volume, and shock Acute diarrhea is commonly associated with a loss of water in excess of electrolytes, if it is allowed to persist, serious dehydration with cellular hyperosmolarity may lead to mental confusion, convulsions, and even death Since the administration of salt increases the hypertonicity of the extracellular fluid, a hypotonic solution (two parts of 5 per cent dextrose in water to one part of 5 per cent dextrose in normal saline) should be used for replacement therapy The use of hypertonic solutions in patients having increased extracellular fluid, with pleural effusion, ascites, or edema may result in retention of excess water and further expansion of extracellular volume

For the replacement of abnormal losses of fluid and electrolytes from the gastrointestinal tract, Layne and his co workers (1954) advocate the use of hypotonic or isotonic electrolyte solutions by vein with adequate amounts of plain water and dextrose For example, 0 45 per cent of sodium chloride in a 5 per cent solution of dextrose can be used for rehydrating the cells, restoring extra cellular fluid, and providing expendable fluid as well as some calories When there is a greater proportional need for sodium than for chloride, 40 to 80 mEq of molar sodium lactate may be added to 1 l of 5 per cent dextrose in water When there is a greater proportional need for chloride than for sodium, ammonium chloride (4.5 Gm in a liter of 2 per cent dextrose) may be administered intravenously Acidifying salts, however, do not replace potassium which is an important cation Most commercial solutions do not contain enough potassium to produce serious myocardial effects

Perception of pain is a physiopathologic process The pain perception threshold is constant for a given individual A specific stimulus will produce pain only after a threshold is reached Anatomically pain perception is the result of a specific receptor a conduction system and an interpretation area in the cerebral cortex In contradistinction to the perception of pain reaction to a painful stimulus varies from individual to individual and even in the same individual from time to time The pain reaction is dependent upon many factors such as age sex race environmental circumstances past experience central nervous system irritability emotional state and mental attitude No definite localized anatomic apparatus is responsible for the function of pain reaction

THE USE OF DRUGS TO CONTROL PAIN

Analgesic and sedative drugs exert their pain relieving effect by raising the threshold for the perception of pain by altering the pattern of reaction to pain or by both methods *The peripheral nerves* and sensory receptors are not affected by *morphine or other narcotics* It is thus obvious that the *analgesic* effects of the narcotics are the result of their action on the central *nervous* system Recent investigation has demonstrated that narcotics have more effect on pain reaction than on pain perception *The major* function of the opiates particularly *morphine is to alter the re*action to pain The pain is still perceived but the patient is capable of tolerating it

Any physician who has a license to do so *can prescribe* narcotics for pain but *their proper use* is an art Patients deserve more intelligent methods of *pain relief* than routine and haphazard administration of narcotics *For each individual* patient there is one specific narcotic that is particularly suitable for the control of pain By trying different types of narcotics one can determine the drug best suited for a particular patient The cerebral effects of morphine may be desirable in patients whose pain has a high psychogenic component In others the euphorigenic effect may prove to be an uncomfortable sensation While *morphine* is considered by many physicians to be the analgesic *of choice* for the pain of acute myocardial infarction it is inconceivable ..

CHAPTER 6

The Relief of Pain

D. LeROY CRANDELL

It is difficult to think of a pathologic condition that is not associated with some degree of discomfort or pain Pain, with all its complexities, is a problem that the physician encounters daily in his medical practice Its control gives rise to more problems now than formerly, for more people are being temporarily retrieved from death and are enduring longer, more drawn out terminations of their illnesses

Pain is a subjective phenomenon with objective manifestations This fact alone accounts for the difficulty encountered in the control of pain Leriche (1939) wrote, 'Physical pain is not a simple affair of an impulse traveling at a fixed rate along a nerve It is the resultant of the conflict between a stimulus and the whole individual" Our failures to control pain in the past have been partly the result of failure to recognize the psychosomatic aspects of pain Intractable pain produces psychologic as well as physical depletions Too often attention is focused on the interruption of the pain pathways, without sufficient thought to the psychogenic aspects of the problem Psychologic factors can modify pain at any level of intensity The psychologic implications in the pain experience are probably more important, although less understood, than any other facet of the problem The employment of psychotherapeutic measures such as patience, sympathetic understanding, moral encouragement, and confident reassurance are vital to success in relieving pain

Pain consists of two components (1) the physical perception of pain and (2) the psychologic reaction to pain Both components must be considered in the clinical approach to the problem of pain The dissociation of these two components is one of the basic approaches to its control

long or by what means the patient has been treated elsewhere, the first prerequisite to the successful management of chronic pain is a complete history and physical examination to determine the etiologic mechanism and neural pathways involved Anyone experienced in dealing with the problems of pain can cite cases in which previous medical treatment of the pain had been misdirected, and a simple procedure based on a thorough history and physical examination resulted in complete relief The history and physical examination also allow the examiner to become acquainted with the patient, to evaluate his tolerance to pain, and to form an opinion as to the psychic components present Once the physician has accurately identified the neural pathways involved, whether of the autonomic or the somatic nervous system, he will be able to formulate a plan for interrupting the pain pathways by appropriate surgical or chemical measures In many cases regional nerve blocks with local anesthetic agents will break the pain cycle and effect complete relief If the stimuli are persistent, as in malignant disease, interruption of the neural pathways with a neurolytic agent or by a surgical procedure will have a more lasting effect

It must never be forgotten that the patient's confidence in the physician based on the physician's enthusiastic yet sympathetic approach, is of prime importance in determining the effectiveness of any method of managing pain The importance of psychotherapy in the management of pain is emphasized by a recent investigation which showed that in fully one third of the patients studied postoperative pain was relieved by a placebo (Papper, Brodie, and Rovenstine, 1952)

The major types of pain and their therapy in the geriatric patient will now be considered.

Acute Somatic Pain

Somatic pain is characterized by sharpness and accurate localization Pain fibers of somatic origin course through spinal nerves to reach the central nervous system The interruption of peripheral afferent somatic pain path [illegible]
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of violent retching and vomiting such as frequently result from the administration of morphine.

Methadone hydrochloride, a heptanone derivative, has an analgesic potency equivalent to morphine. Dilaudid has five times the analgesic potency of morphine. Either Methadone or Dilaudid provides *analgesia equivalent to that obtained with equipotent doses* of morphine, and produces less euphoria and fewer side effects *such as nausea, vomiting, and constipation. This* advantage over morphine is an important consideration in prescribing narcotics for the relief of pain. In some conditions the spasmogenic effect of morphine is to be avoided. Demerol, because of its spasmolytic action, is preferred in these cases. Despite the claims for Pantopon, it is nothing more than an expensive form of morphine.

The best pain relief is afforded when the narcotic is administered intravenously. When the intravenous route is used, small doses of morphine (4 to 8 mg.) or Demerol (25 to 50 mg.) act more effectively and rapidly and cause less circulatory and respiratory depression than larger doses given subcutaneously. In the first 4 to 6 *hours after operation, the intravenous administration of one* half *to* one fourth of the usual dose of narcotic will prevent depression *of vital physiologic mechanisms. Too often, however, postoperative* restlessness and delirium are manifestations of cerebral hypoxia, a condition in which narcotics are contraindicated.

Although the barbiturates, tranquilizers, and other sedatives are not analgesics, they are valuable adjuncts in the treatment of pain, since they modify the psychic reaction to the painful stimulus. These drugs, as well as the narcotics, dissociate the perception of pain from the reaction to it, and thus effect a temporary pharmacologic prefrontal lobotomy. By combining a barbiturate or tranquilizer with a small dose of a narcotic, the adverse pharmacologic effects of large doses of narcotics can be avoided. When the psychic components of pain, such as apprehension and fear, are prominent factors in the pain experience, a barbiturate or tranquilizer alone may suffice.

OTHER METHODS FOR THE CONTROL OF PAIN

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obtained by sympathetic blockade with local anesthetic agents If a thoracic viscus is the source of pain, paravertebral block of the upper five or six sympathetic ganglions may be effective For pain arising from abdominal viscera, a block of the splanchnic nerves or celiac ganglion is done The vagus nerve does not conduct pain

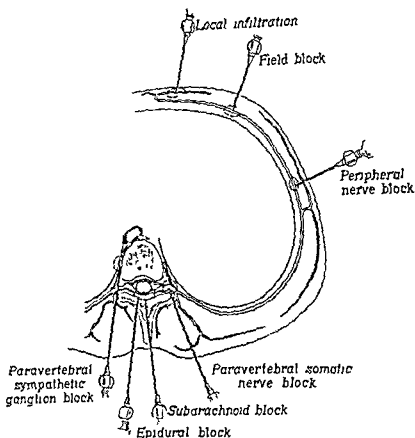


Fig 6 3 A diagrammatic illustration showing the various sites at which a typical thoracic spinal nerve may be blocked

sensations from the abdominal viscera The afferent pain fibers to the bladder rectum, and uterus come through the sacral parasympathetic nerves Since most of the viscera, with the exception of the kidneys ureters and ascending and descending colon, have bilateral innervation, a bilateral nerve block usually must be done

Pain of both visceral and somatic origins may be referred to a

cent) has given consistently good results A few examples of this method of therapy are brachial plexus block for the relief of acute brachialgia, suprascapular nerve block for the relief of sub acromial bursitis, and cervical block for the relief of acute torticollis and pain in the greater occipital nerve In traumatic and post-operative pain, regional nerve blocks are of value where early ambulation is desired and the adverse circulatory and respiratory effects of narcotics are to be avoided Often the interruption of the pain cycle will long outlast the duration of the local anesthetic In many cases, only one to three blocks are needed to provide permanent relief from acute somatic pain

The utilization of intercostal block for the relief of pain due to multiple rib fractures or costochondral separations is of great value in the geriatric patient In these situations pain leads to impaired pulmonary ventilation, with retention of secretions and the subsequent deleterious effects of infection, hypoxia and hypercarbia When pain relief is afforded by immobilization and narcotics, pulmonary ventilation and the elimination of secretions are further impaired An appropriate intercostal nerve block not only relieves pain, but promotes rather than impedes pulmonary ventilation and in addition preserves the cough reflex and ciliary activity for the elimination of secretions

The intravenous administration of dilute solutions of procaine (500 mg in 500 cc of 5 per cent dextrose in water) or a 5 per cent solution of alcohol has been efficacious for the relief of pain associated with generalized pruritic dermatoses and thermal injuries

In conjunction with physiotherapy the intravenous administration of curare under the supervision of an anesthesiologist has been beneficial in the treatment of painful muscle spasms The muscle spasms associated with torticollis trauma and arthritis have been especially responsive to this form of therapy

Visceral Pain

In contrast to somatic pain visceral pain is deep dull and poorly localized Pain fibers of visceral origin course through the autonomic nerves (sympathetic and parasympathetic) before entering the dorsal spinal roots and the central nervous system

Gratifying results in the treatment of visceral pain have been

and trophic changes The pain and vasomotor changes are often improved or completely abolished by interruption of the involved sympathetic pathways, in conjunction with physiotherapy The sympathetic pathways to the upper extremity are interrupted by stellate ganglion block, and those to the lower extremity by blocking the paravertebral lumbar sympathetic ganglion

Pain of Peripheral Vascular Disease

As people exercise less and live longer, more alterations in the function of the peripheral vascular system are being seen

In peripheral vascular disease, the obstruction to blood flow is the result of two components, present in varying degrees (1) organic occlusion and (2) functional vasospasm Vasospasm is the factor that is controllable and most responsive to therapy In Raynaud s disease and phenomenon, the vasospastic element predominates Thromboangiitis obliterans exhibits a decreasing vasospastic element as the organic occlusive element progresses In arteriosclerosis obliterans, the occlusive element predominates, but some vasomotor spasm is often present

In many cases abolishment of the vasospastic element by sym pathetic inhibition will produce improvement in the circulation and relief of pain The more severe and extensive the organic occlusive element, however, the less are the chances for improvement by interruption of the sympathetic pathways

By sympathetic block of an extremity, it is possible to determine whether alterations in blood flow to the extremity are due to generalized obstruction of the arteries and arterioles or to spasm of the vessels For best results, the constant temperature room and a constantly recording thermometer should be used For an upper extremity the stellate ganglion and the second third, and fourth thoracic sympathetic ganglia on the corresponding side must be blocked The results are checked by [illegible] reflex (Lewis 1955) although one [illegible] of a Horner s syndrome does not necessarily mean that complete sympathetic blockade has been accomplished For a lower extremity sympathetic blockade of the first, second, and third lumbar ganglia is accomplished through a paravertebral approach If anti

corresponding cutaneous segment, but pain of the latter origin is more clearly localized. The reflex areas of hyperalgesia, muscle tenderness and spasm, sweating, vasomotor changes, and increased pilomotor activity usually associated with visceral pain may aid in determining the viscus from which the pain is arising. When cutaneous pain is of visceral origin, the interruption of somatic pain pathways will not relieve it.

Intractable angina pectoris is frequently relieved following a block of the upper five thoracic ganglia, either through the left paravertebral approach or by a left stellate ganglion block. A bilateral sympathetic block is avoided for fear of producing vagal cardiac arrest. Newer operative procedures aimed at increasing the coronary blood flow through anastomotic collateral vessels may prove to be more valuable in the management of angina pectoris.

In such visceral disorders as acute pancreatitis and the post-cholecystectomy syndrome, pain relief may be accomplished by interrupting the splanchnic nerve pathways with subarachnoid, epidural, or paravertebral blocks. Best results have been afforded by the injection of a 0.15 per cent solution of tetracaine hydrochloride every four to six hours through an indwelling polyvinyl catheter inserted into the epidural space.

The pain of acute pancreatitis is associated with reflex spasm of the duodenum, the sphincter of Oddi, and the pancreatic ducts. Morphine augments these adverse effects. Demerol and the parasympatholytic drugs such as atropine exert a beneficial spasmolytic action. Blocking the splanchnic nerve or celiac plexus not only relieves pain but abolishes the reflex visceral spasm. If splanchnic block is effective but does not relieve the pain permanently, a neurolytic agent such as phenol in a 6 per cent solution may be injected, or surgical interruption may be performed.

Pain of Autonomic Imbalance

Causalgia and other reflex sympathetic dystrophies such as the shoulder-hand syndrome and phantom limb pain are produced by autonomic imbalance. The reflex pain does not conform to any segmental or peripheral nerve distribution, and is associated with hyperalgesia and hyperesthesia, and with vasomotor, sudomotor

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coagulant therapy is to be instituted, a polyvinyl catheter may be inserted into the lumbar epidural space for continuous sympathetic blockade.

The most common peripheral vascular disease encountered in the geriatric patient is arteriosclerosis obliterans. In the patient with this condition who is a candidate for sympathectomy, an appropriate sympathetic block will indicate the increase in blood flow that may be expected from surgery. Digits revealing a decrease in temperature and increased pain following sympathetic block may become gangrenous following sympathectomy. This paradoxical effect occurs when much of the circulating blood is shunted away from the distal portion of the extremity through dilated arterioles proximal to an area of obstruction in the main artery. Sympathectomy is obviously contraindicated when this phenomenon appears following a sympathetic block. If temperature studies following sympathetic blockade indicate the presence of vasomotor tone, a surgical sympathectomy should be beneficial.

The disease entities commonly associated with various degrees of vasospasm in the geriatric patient are accidental trauma (such as crush injuries and those due to cold and refrigerant gases), surgical trauma (such as that associated with the repair of vessels injured by the newer graft procedures for arterial obstruction), postembolic spasm, and reflex vasospasm associated with acute thrombophlebitis.

The functional changes and concomitant vasospasm in the inflamed or traumatized vascular system obstruct the blood flow and increase the pressure in small vessels locally. The degree of change occurring will be inversely proportional to the amount of collateral circulation that is available. If the original lesion is obstruction, spasm soon follows, producing increased capillary permeability and edema, and thus forming a vicious self-perpetuating cycle. The important phase in this cycle is spasm. When this is abolished by sympathetic blockade, the whole cycle is broken. Elevation of the extremity for gravity drainage then becomes a really effective tool. Pain due to ischemia is relieved by the resultant improvement in circulation. In more than one case following an embolus to the popliteal or femoral artery sympathetic blockade has made it possible to avoid amputation of the leg, or has allowed an amputation to be performed at a lower level.

Chronic Pain

The intractable pain associated with inoperable malignant lesions is frequently encountered in geriatric patients There is no greater challenge in medicine than that afforded by the problem of intractable pain It is vitally important to institute rational methods of pain management before a central pain pattern develops or the patient becomes addicted to narcotics

Reliance on narcotics for the management of intractable pain requires increasing doses given at closer intervals with diminished effectiveness The best solution is offered by *early* surgical or chemical interruption of the pain pathways The results following such a procedure will be discouraging if a central pain pattern or addiction to narcotics has developed In such cases the interruption of the pain pathways may only serve to reduce the narcotic requirement It is unbelievable that some physicians would force a patient to choose between narcotics and chordotomy or would evaluate the success of a chordotomy by the rapidity with which narcotics can be discontinued

Preliminary block with local anesthetics is a valuable adjunct in planning a surgical procedure for the relief of intractable pain and should be used with greater frequency When a chordotomy is contemplated subarachnoid block to determine the level of sensory analgesia required to produce relief of pain may provide the neurosurgeon with valuable information

When pain of visceral origin remains localized it can best be controlled by blocking the paravertebral sympathetic ganglion with a 6 per cent solution of phenol This solution is preferred to alcohol for peripheral nerve blocks because *neuritis* is a serious and frequent complication following the *injection of alcohol* Since metastasis and spread to adjacent organs are characteristic of malignant lesions subarachnoid block may become necessary The eff[illegible]
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sphincter. Subarachnoid alcohol block should be limited to patients who are in such poor physical condition that surgery constitutes an unjustifiable risk, or whose life expectancy is measured in terms of a few weeks or months. The average duration of pain relief following this procedure is three to five months.

If the patient is in good physical condition, he should be afforded permanent relief by a neurosurgical procedure. The efficacy of rhizotomy, sympathectomy, spinothalamic chordotomy, and prefrontal lobotomy in relieving intractable pain is beyond dispute. Even the surgical interruption of the pain pathways, however, may be accompanied by serious complications and occasional failures. Prior intrathecal injection with neurolytic agents may complicate the surgical procedure. Because of the adverse personality changes that often develop subsequent to prefrontal lobotomy, spinothalamic chordotomy is generally preferable. In patients with limited life expectancy who do not respond to chordotomy, or in whom chordotomy is not indicated, prefrontal lobotomy may be necessary. Although pain can still be perceived following prefrontal lobotomy, the affective response to pain is modified.

Central and Psychogenic Pain

At this point it must be emphasized that a thorough history and physical examination are mandatory in every patient with the primary complaint of pain. A diagnosis of psychogenic pain should not be made until every effort has been made to discover an organic cause. In the elderly patient who has vague generalized chronic pain without a demonstrable organic basis, attempts to relieve the pain are often disappointing regardless of the method employed. While subarachnoid block may help to determine whether the somatic pain is peripheral or central in origin, failure to abolish pain by this procedure does not definitely indicate that a patient is suffering from central or psychogenic pain. Under certain conditions, the sensation of pain may be transmitted over extraspinal pathways.

Psychogenic pain is best treated by psychotherapy. Narcotic addiction may be the basis of psychogenic perpetuation of pain. If the psychic component is not recognized, the patient may be subjected to unnecessary surgery. On the other hand, chronic pain associated with organic disease must be given early treatment with proper and

adequate methods of pain control in order to prevent the development of a central pain pattern that may require prefrontal lobotomy to relieve the patient's suffering

Certain instances of intractable pain may require the combined efforts of the radiologist, orthopedist, internist, neurosurgeon, and anesthesiologist The fact remains, however, that the fundamental basis for the management of pain is recognition of the interplay between the physical perception of pain and the psychic reaction to pain. This fact has been mentioned repeatedly for the purpose of emphasis In the final analysis, the employment of psychotherapeutic measures for the relief of pain is just as important as the chemical or surgical interruption of the pain pathways

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CHAPTER 7

Surgical Principles

HOWARD H. BRADSHAW

THE OLDER PATIENT AS AN OPERATIVE RISK

Advanced age undoubtedly increases the risk of operation, although the degree of increase has been greatly exaggerated in the past. Until recent years, many surgeons operated on elderly patients only in cases of dire emergency and when death seemed certain without operation. Because the number of persons surviving the Biblical span of three score years and ten is gradually increasing it is inevitable that there will be more older individuals requiring surgery year by year. Every surgeon who has been interested in the surgery of older patients has come to recognize that, if proper precautions are taken, the risk is not nearly as great as was commonly believed, even for extensive operations. From collected data it appears that few if any necessary operative procedures should be refused individuals in this age group. Patients should not be permitted to die merely because they are thought to be too old to live.

Even though surgical procedures can often be carried out safely and successfully in elderly patients, however, they are unquestionably attended by greater dangers in old age than would have been the case in middle life. Many operations on aged patients could have been obviated if correct judgment had been used and the proper treatment urged when they were younger. Notable among the conditions often neglected until surgery becomes imperative in later life are gallstones, recurring duodenal or gastric ulcers, hernias, perineal lacerations, varicosities and bronchiectasis.

With the help of metabolic studies and other tests that provide specific information about the effects of the aging process on an

individual the surgeon is now better able to prepare the older patient for the ordeal of anesthesia and operative trauma Among the important changes that may take place in old age are a decrease in the circulating blood volume, a loss of elasticity of the blood vessels pulmonary fibrosis and emphysema The functions of the heart liver and kidneys are often impaired and the metabolic rate is lower It is impossible to generalize on the problems that older patients may present in addition to the specific problem for which surgery is required The tissues an individual inherits the conditions that have surrounded him during his life, his occupation and the diseases he has had may all have left their mark upon him and require consideration in evaluating him as an operative risk When the function of an organ is impaired the variety of disturbances associated with any operative procedure may cause it to cease work altogether

It is generally believed that the power of healing diminishes with advancing age This idea is based almost entirely upon limited studies of the epithelialization of granulating wounds Most surgeons however are concerned more with the tensile strength of sutured wounds which depends on connective tissue rather than epithelial growth It is true that young growing animals including babies show more efficient and rapid healing or fibroplasia than adult animals The tensile strength of abdominal wounds however, is just as great in mature animals Clinical experience furthermore, has shown that the incisions usually necessary in individuals of advanced age heal just as well as they do in younger patients While impaired vascularity of the tissues—which is more frequent in the aged does retard or prevent normal healing this condition is most apt to affect the extremities Healing in general is influenced by a great many systemic factors which are present at all ages and which are probably much more important than the age of the individual

The resistance to infection especially to infection of the peritoneum is diminished with advancing age The compensatory response to hemorrhage is less effective and even moderate hypotension in elderly patients is of serious import Tissue trauma is more likely to cause circulatory embarrassment in old people than in younger individuals Adequate blood replacement and gentle handling of the tissues are therefore mandatory Thrombosis and em

CHAPTER 7

Surgical Principles

HOWARD H. BRADSHAW

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bolism are frequent postoperative complications, and pulmonary embolism is one of the commonest causes of death. Pneumonitis, atelectasis, and pulmonary edema are other complications which are frequently encountered after operation.

Older patients tend to have less cardiac reserve—but we now believe that very little extra reserve is needed for most operations, even when general anesthesia is used.

While tests of renal capacity show few, if any, changes with advancing years, there is usually definite evidence of impaired renal function after a major operation.

Very little is known of the influence of increasing age on hepatic function. The nutritional intake has an important bearing at all ages, as does the deleterious effect of certain anesthetic agents, notably chloroform, ethyl chloride, and divinyl ether.

DIAGNOSIS OF CONDITIONS REQUIRING SURGERY IN THE OLDER PATIENT

The conditions most commonly requiring operations in older patients are appendicitis, gallstones, prostatic disease, hernia with or without obstruction, cancer, uterine procidentia, gangrene of part of an extremity, and fracture of the femoral neck. The diagnosis of any of these conditions is usually somewhat more difficult in elderly patients, for reasons which will be discussed later. Every surgeon, even after years of experience, has either missed the diagnosis of acute appendicitis or delayed in making it. Abdominal tenderness may be practically lacking in old people with appendicitis, and they may not show the characteristic fever and leukocytosis. Their reaction in this, as in other serious intra-abdominal and intrathoracic conditions, is a passive one. They are less apprehensive than younger patients, and tend to minimize both their symptoms and the pain produced by physical examination. While this attitude makes diagnosis more difficult, it also minimizes the disturbance produced by the ordeal of surgery.

Even though the diagnosis of a surgical condition may be obscure in older patients, it is a mistake to indulge in prolonged, expensive procedures requiring the aid of many consultants in arriving at a plan of action. Even when the definitive diagnosis is not

evident, a decision as to the necessity for operation can usually be made quickly The necessary preoperative evaluations should be done without a waste of time and with the introduction of as few strangers as is consistent with careful study Old people are often more frightened by the atmosphere of a hospital and by strange faces than they are by the disease that afflicts them

PREOPERATIVE CARE

It is perhaps superfluous to state that patients who are being prepared for surgery should be properly hydrated and that their blood volume and protein reserves should be made adequate It has been observed that elderly people often have nutritional deficiencies of one type or another the most important being a protein deficiency Loss of teeth may cause them to restrict their diets to soft foods or even liquids Repeated small transfusions of whole blood may be required to build up their protein reserve They should be encouraged to eat a well rounded diet supplemented with vitamins They may need concentrated food in the form of a gastrostomy formula or one of the commercial preparations such as Sustagen If necessary the feedings may be given through an indwelling gastric tube Often these older patients have no will to live and want to be left alone to die in peace This attitude may be the result of poor nutrition

Now that the pendulum has swung away from giving too little fluid and nourishment preoperatively there is danger of overloading the circulatory system with various fluids and electrolytes which can produce edema of the lungs and other tissues Intravenous fluids must be given very slowly When there is apprehension about the status of the pulmonary cardiovascular or renal excretory system it would seem wise to use the subcutaneous route of fluid administration as much as possible Even fluids with some caloric value such as glucose and protein hydrolysate can be given safely by the subcutaneous route Protein can easily be supplied by transfusions of whole blood or plasma and other fluids and electrolytes can be given subcutaneously Parenteral fluid by whatever route should be used cautiously

Elderly patients do not tolerate large amounts of salt, and edema

sometimes develops rapidly and unexpectedly Perhaps the maximum daily salt intake should be approximately 5 Gm unless there is need for replacing definite salt losses If no evidences of dehydration are present 1 000 cc of fluid daily, in addition to that contained in food should suffice for an elderly patient of average size It is safer to have tissues a little on the dry side rather than run the risk of edema

Patients should not be allowed to remain in bed preoperatively unless their primary disease requires bed rest They should be urged to go to the bathroom and to walk about the ward If tests indicate impairment of any particular organ or organs special attention should be directed *toward them So called tonic doses of* digitalis have been out of vogue for many years Such potent drugs as quinidine and digitalis are not given unless cardiac failure or *irregularities exist at the time of operation or have been known to* exist previously If there is any question about the cardiac status it is wise to have the aid of the family physician or an internist *Patients who have had previous coronary artery disease can under* go anesthesia and surgery with very little added risk provided there has been no recent infarct Patients with long standing *valvular defects if one excludes the aortic valve withstand opera*tions satisfactorily

A very important part of the preoperative preparation of any pa*tient and especially of the elderly patient is kind and sympathetic* attention and a thorough explanation of what is being done why it is being done and what is to be done further Previous surgical *experiences or the lack of them will greatly influence the patient's* attitude If it can be avoided the life long habits of these older people should not be radically changed while they are in the hos*pital The laxatives the sleeping pills the toddy or the tobacco that they have used for many years won't affect the success of the oper*ation and their continued use will contribute much to the patient's *peace of mind*

Even in emergencies time must be taken to overcome dehydration and shock preoperatively It is foolish and hazardous to under*take any major operation such as that for intestinal obstruction for* example in the presence of dehydration and shock Unless these states are corrected first it can be expected that the patient will die on the *operating table or shortly after operation*

ANESTHESIA AND PREANESTHETIC MEDICATION

Much has been written about preanesthetic medication and the different types of anesthetic agents. Because old people require less of any drug to produce a given effect and because they are usually self-disciplined and patient, they make especially favorable subjects from the anesthetist's point of view. The dosage of anesthetic agents must depend upon an evaluation of many factors including the patient's age, size, occupation, activity (habitual and recent), hemoglobin, appetite, recent weight loss, pain and recent use of other sedatives.

The preanesthetic and the anesthetic medication must be coordinated so as to complement each other. The preanesthetic medication should be given in the proper dose by the proper route and at the proper time to obtain its peak effect at the beginning of anesthesia. Since the aging process—as has been stated before—is associated with a decrease in metabolism and often, if not always, with degenerative changes in the detoxifying and excretory organs, the doses of the drugs used should be reduced accordingly. A small dose of a barbiturate, 0.1 Gm. (1.5 gr.) of phenobarbital or secobarbital (Seconal), may be used for psychic sedation. Unless pain is present, there is no need for a narcotic. Scopolamine (hyoscine) 0.3 to 0.6 mg. (1/200 to 1/100 gr.) is an excellent drug for most patients, but in the presence of advanced cerebral arteriosclerosis it may cause excitement, restlessness and disorientation. The same objection applies to a lesser degree to any belladonna derivative. Chloral hydrate 0.5 Gm. (7½ gr.) or some of the newer nonbarbiturate hypnotics may be used. If an opiate is to be used because of pain, it is probably wiser to avoid morphine unless it is known that the patient can tolerate it without nausea; if it is used the dose is 8 to 16 mg. (1/8 to 1/4 gr.). Demerol in doses of 50 to 100 mg., methadone in doses of 5 to 10 mg. or Dilaudid in doses of 2 to 4 mg. (1/32 to 1/16 gr.) will relieve pain just as effectively, and without the danger of nausea.

The three important components of the anesthetic state are hypnosis, analgesia and muscular relaxation. Most well-trained anesthesiologists believe it unwise to attempt to produce all three of the anesthetic components with a single drug. They maintain that the use of a single drug will inevitably result in unnecessary de-

pression of important physiologic mechanisms. Although surgeons in general have decried the use of multiple drugs for producing the anesthetic state, it is evident that this practice is on the increase, and that more satisfactory anesthesia is being obtained, so that surgery of an increasingly major nature is being done with better and better results. The use of multiple drugs has been blamed for the supposed increase in cardiac arrests during surgery, but proof to substantiate such a claim is lacking.

Basal hypnosis can be produced satisfactorily with the thiobarbiturates, such as thiopental or thiamylal. They should be given to the geriatric patient in limited doses, because they can produce cardiovascular and respiratory depression. In the presence of cardiovascular disease, liver dysfunction or an elevated blood urea nitrogen, sensitivity to these drugs is increased. If these drugs alone are used to produce the complete anesthetic state, acute barbiturate poisoning will be the result.

Nitrous oxide is perhaps the best agent for producing primary analgesia, but it will usually need to be supplemented with cyclopropane or ether. If there is a defect in the cardiac conduction system, ether is the better choice. If the electrocautery or electrocoagulation is to be employed, a continuous intravenous drip of meperidine may be used for supplemental analgesia.

Adequate muscular relaxation can be obtained without recourse to deep anesthesia by using succinylcholine as an intravenous drip in a 5 per cent solution of dextrose and water, or d-tubocurarine, 6 to 12 mg. in 2 to 4 cc. of aqueous solution intravenously. With the use of these agents, the physiologic mechanisms that compensate for trauma and acute blood loss are preserved. The chief danger from the use of muscle relaxants lies in "covering up" poor anesthesia. The deleterious effects of their misuse may not become evident until the immediate postoperative period.

Techniques for administering various anesthetic agents are changed from time to time. Adequate oxygenation of tissues and the elimination of carbon dioxide are of primary concern. In the older patient, the partial rebreathing or nonrebreathing system is preferable to the completely closed system, because there is less change in the intrapulmonary pressure. Increases in intrapulmonary pressure interfere with cardiac filling, and are therefore dangerous, particularly in patients with a low blood volume and evidence, how-

ever mild, of cardiovascular failure An endotracheal tube of the largest compatible diameter aids in reducing the dead space and in maintaining a patent airway

Whenever practical, regional nerve block or local infiltration anesthesia, combined with a hypnotic or analgesia drug, is the method of choice in older patients These anesthetic methods should be limited to operations on the head, neck, body surface, and extremities When extensive procedures are done under local or regional anesthesia, the result is often overdosage, with toxic reactions The quantity and concentration of the anesthetic agent should be reduced in geriatric patients

Spinal anesthesia for patients in this age group should be restricted to operations below the navel Higher levels of spinal anesthesia are frequently accompanied by hypotension and a significant reduction in the cerebral and coronary blood flow

SURGICAL TECHNIQUE

For many years thoughtful surgeons have been emphasizing preoperative preparation, the anesthetic, the physiologic, and the chemical changes induced by surgery, and the prevention of postoperative complications Consequently, surgical technique has not received the attention that it once did However, surgeons who are able to operate rapidly and gently and who demand relatively light anesthesia will have a much lower mortality rate than those who operate slowly, who use the rough technique of past decades, and who insist on the deepest planes of anesthesia While differences in surgical technique are not as decisive in younger patients, any unnecessary increase in local trauma, in blood loss, or in the depth or duration of anesthesia will inevitably lead, in the older age group to a high mortality from circulatory impairment, infection, thrombosis and other complications

THE POSTOPERATIVE PERIOD

Hypotension respiratory obstruction or depression, oliguria, and nitrogen and salt retention are the problems most frequently encountered in the immediate postoperative period Restlessness and delirium are frequent manifestations of hypoxia, and one may be

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tempted to give a narcotic for these symptoms Such drugs are definitely contraindicated, however, for their depressant action may *produce a fatality For the relief of pain, small doses of Demerol* or a longer-acting narcotic should be given by the intravenous route This method is more effective than intramuscular administration and will cause minimal circulatory or respiratory depression In some patients other methods for pain relief, such as regional nerve blocks or the intravenous administration of alcohol and procaine may be preferable to the use of narcotics

The relatively recent innovation of the recovery room has proved to be a most efficient means for dealing with problems arising in the immediate postoperative period

The commonest causes of death in the later postoperative period are pulmonary complications such as embolism, pneumonitis at *electasis, or edema Early exercise and ambulation are most* important in preventing these complications Long before early ambulation became the standard practice, practically every surgeon realized the importance of getting elderly patients up as soon as possible after operation, in order to avoid so called hypostatic pneumonia It is curious that early termination of bed rest was used for older surgical patients at a time when it was considered much too radical to be used for younger patients Among the benefits of early ambulation should be listed better aeration of the lungs especially their bases improvement in muscle tone with a resulting increase in venous flow, and improvement in appetite, digestion, and bowel function, with lessened abdominal distention from gas

CHAPTER 8

Infectious Diseases in Older People

ELLARD M YOW

TOLERANCE AND SUSCEPTIBILITY

The clinical observation has often been made that the very young and the very old tolerate infections poorly While we do not know precisely how the mechanisms for handling infections differ among the various age groups, we do know that recovery from tuberculosis, for example, seems to be most rapid between the ages of 5 and 15 years, becoming gradually more prolonged with increasing age (Myers, 1954) The difficulty that aged patients have in coping with infections has been attributed to poor antibody response and decreased ability to produce leukocytes to combat infection It has been shown in pediatric patients that gamma-globulin levels reach a low point at about 6 months of age, but results of comparable studies at the other extreme of life are not available

There seems to be little doubt that infections ultimately become serious problems in aged patients Nevertheless, there is a difference be[illegible] in-fection [illegible] tol-erate [illegible] poorly, they are less susceptible to attack by many infectious agents The percentage of individuals with a negative Schick test, for example, increases with age Most of the common contagious diseases of childhood produce a prolonged immunity, and consequently are rare in elderly individuals Lifelong immunity follows most of the rickettsial diseases, and many bacterial diseases for example, scarlet fever, brucellosis, tularemia, typhoid fever, and infections with *Hemophilus influenzae*—are associated with relatively long periods of decreased susceptibility All these infections are less frequent in older persons

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There seems to be little doubt that infections ultimately become serious problems in aged patients Nevertheless, there is a difference between *susceptibility* to an infection and *tolerance* to an infection once it becomes established While older people often tolerate infections poorly they are less susceptible to attack by many infectious agents The percentage of individuals with a negative Schick test for example, increases with age Most of the common contagious diseases of childhood produce a prolonged immunity, and consequently are rare in elderly individuals Lifelong immunity follows most of the rickettsial diseases and many bacterial diseases for example scarlet fever, brucellosis, tularemia, typhoid fever, and infections with *Hemophilus influenzae*—are associated with relatively long periods of decreased susceptibility All these infections are less frequent in older persons

Studies of pneumococcal pneumonia provide data illustrating the response to infection among different age groups. The *incidence* of the disease rises from birth to a peak in the third and fourth decades, and then *gradually decreases with increasing age*. The *mortality* rate in untreated cases, on the other hand, steadily rises from approximately 10 per cent in the first two decades to 50 per cent in the sixth decade and 70 per cent in the eighth (Heffron, 1939).

Clinical and epidemiologic studies made during the 1957–1958 epidemic of Asian influenza provide some interesting observations regarding this viral respiratory infection. Since viral infections have *been thought to be followed by a short period of immunity*, one would expect the highest attack rates at the extremes of life, where resistance to infection is considered poorest. In this epidemic, however, the attack rate was highest in childhood and became progressively lower in older age groups. The most plausible explanation is that relative immunity was conferred on older persons, not by highly strain-specific antibodies, but by a composite of antibodies built up *from repeated exposure to the other antigenic* variants of influenza A.

This thesis is supported by studies on pools of serum collected from groups of people divided into two year age intervals. The antibody detectable by complement fixation with Asian virus antigen was not present in persons below the age of 30 *years, but was* usually present at low levels in those above 30. Of further interest is the observation that 11 of 14 individuals above the age of 80 who were given 250 chicken-cell agglutination (CCA) units of Asian influenza virus vaccine showed a rise in antibody titer from less than 1:32 to 1:281. Only 16 of 73 individuals in the middle and younger age groups showed any rise, and in these the titer was never greater *than* 1:32 (Davenport, 1958).

General data concerning all respiratory infections requiring one or more days in bed, including influenza and pneumonia, indicate that the greatest increase in incidence during the "Asian flu" epidemic—40 new cases per week per 1,000 persons—occurred in the *5 to 19 year age group, at the same time the lowest incidence was* in the age group of 65 and over, with less than 10 new cases per week per 1,000 persons (Perrott and Linder, 1958).

Despite the decreased susceptibility of older individuals to respiratory infections, the highest mortality rates during this epi-

demic were in children below the age of 10 and in adults above the age of 45 Of 23 deaths reported by one group only 4 occurred in the 11 to 40 year age group while there were 6 in patients between 41 and 50 and 5 in the 51 to 60-year age group (Herrmann *et al*, 1958) Most of the deaths were due to bacterial infections complicating the viral disease Staphylococcal pneumonia was the cause of death in approximately half the cases Heart failure, respiratory failure and kidney failure have been significant factors increasing the death rate among older patients

While the attack rate of tuberculosis is highest in young people, this disease is peculiar in that the causative organism persists in the tissues of the untreated patient for many years The susceptibility to new exogenous infection declines rapidly after adulthood but the tolerance to tuberculosis also decreases with age In the age group from 5 to 9 years the mortality is less than 5 per 100 000 population but after the age of 50 it is approximately 75 per 100 000 population It is interesting to note that until the age of 30 the mortality from tuberculosis is the same in men and women but after that age the mortality rate is approximately twice as high in men (Myers 1954)

Infectious processes often complicate noninfectious diseases that occur more commonly in the aged Some of these diseases are associated with decreased resistance to infection The dysgammaglobulinemia [illegible] in indi[illegible] suscepti[illegible] this association has been so striking that myeloma cells are always sought in older people admitted with pneumococcal meningitis (Beeson 1958) Other diseases more common in older age groups—for example nutritional deficiencies chronic liver diseases widespread malignancies and uncontrolled diabetes—are also associated with protein deficiencies and poor antibody production

In older people with degenerative diseases normal mechanical methods of controlling body secretions become less effective Infections of the lung are more difficult to handle if superimposed on senile emphysema or anatomic bronchial dilation with stasis of secretions and infected material Treatment may be even more difficult in individuals with obstructive emphysema just as poor results follow attempts to treat collections of infected material in any

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sultant aortic insufficiency may convert compensated heart disease into severe resistant heart failure

In patients with compensated senile emphysema respiratory in fections may lead to decompensated obstructive emphysema Bron chiolar obstruction seems to be more frequent in infections due to gram negative bacilli than in such Gram positive infections as pneu mococcal pneumonia Friedlander's pneumonia is an example of pneumonia due to a Gram negative bacillus that has a predilection for patients of middle age and beyond (Weiss *et al* 1954) Be cause of the characteristic tenacious exudate produced (if the pa tient is not too sick to cough up this material), Friedlander's pneu monia can often be suspected clinically before the bacteriologic diagnosis is made The bronchial obstruction resulting from this

[illegible] The anoxia is often manifested early by restlessness later by combativeness and finally by shock and coma In this type of pneumonia tracheotomy should be performed early in order to help the patient eliminate secretions

Relatively mild infections of the lung and kidney may also be manifested primarily by evidence of functional insufficiency Acute pyelonephritis superimposed on benign nephrosclerosis may pre cipitate renal decompensation with uremia Some pathologists have suggested that the transition from benign to malignant nephro sclerosis may be primarily due to an acute interstitial bacterial infection

Another condition sometimes seen in aging patients as a result of functional decompensation precipitated by infection is gangrene of an extremity Infection superimposed on decreased arterial blood flow is so often the cause of gangrene in older individuals that amputation should never be considered before the appropriate sur gical and medical measures indicated to control the infectious proc ess have been carried out The infection not only increases local metabolic needs but also decreases the blood supply further aggra vating the infection particularly when it is due to anaerobic organ isms If the infection can be controlled the necessity of amputation will often be precluded by the resultant improvement in blood flow

part of the body without adequate drainage Infections may aggravate vascular *insufficiency of an extremity, a condition which in* turn facilitates the spread of infection, so that a vicious circle is established

CLINICAL MANIFESTATIONS

The manifestations of infection in older people are frequently altered by decreased functional reserve of the particular system involved Subacute bacterial endocarditis, in which resistant heart failure may be the major manifestation among geriatric patients, offers an example of this difference Until recent years endocarditis was rarely recognized in older people, because of the relatively insignificant evidence of sepsis In an analysis of 8 cases of endocarditis that were not diagnosed prior to autopsy, Glotzer (1953) found that the clinical diagnoses in four adults beyond the age of 40 were heart failure, cerebral infarction, and pulmonary infarction Bayles and Lewis (1940), in a review of 28 cases in patients beyond the age of 40, found that the correct diagnosis was made in only half the cases Renal failure was a major problem in 75 per cent of these patients, and heart failure was more common than in younger patients Zeman (1945) has emphasized the cerebral manifestations of endocarditis in patients over 60

Forty-seven patients with endocarditis were studied in Houston during the five-year period from 1950 to 1955 (Yow 1957) Approximately half of them were individuals over 40 In most of these older patients the underlying heart disease was arteriosclerotic, and murmurs were less prominent than in younger patients with rheumatic or congenital lesions The older age group consisted almost entirely of men, and the most frequent source of the bacteremia was instrumentation of the genitourinary tract Because the genitourinary tract is more important as a focus of infection in older people, prophylactic coverage during manipulative procedures is particularly important in this age group The frequency of penicillin-resistant enterococci as a cause of endocarditis in older males is explained by their increased susceptibility to urinary infections

Endocarditis superimposed on calcific aortic stenosis may be associated with perforation of the aortic valve leaflets, and the re

be treated intensively with the agents having the most potent bactericidal effect against the causative organism As the patient's mechanism for handling infections becomes less effective precise bacteriologic diagnosis becomes more important. The desired therapeutic effect is that of a rifle rather than a shotgun

Infections associated with such chronic anatomic disorders as bronchiectasis pulmonary emphysema and fibrosis and prostatic hypertrophy with urinary retention are often due to more than one organism A very helpful approach to the therapy of these infections is the use of the direct antibiotic sensitivity test" This is performed simply by streaking the infected body fluid or exudate directly onto a blood agar plate and placing the various antibiotic test discs on the inoculated plate The antibiotic that inhibits all or most of the organisms on the plate is usually the drug of choice although its other pharmacologic properties must also be taken into consideration before a final selection is made

Supportive Measures

While the precise role of the corticoid compounds in the management of infectious diseases has not yet been clearly delineated they have unquestionable value as anti inflammatory agents in some cases The inhibition of inflammation has certain hazards since the inflammatory reaction is one of the body's chief defense mechanisms against infectious agents This defense mechanism can be fatal however if the inflammatory edema disturbs some vital function Such a disturbance is most likely to occur in diseases of the tracheobronchial tree where the swelling may interfere with the exchange of air and in infections of the central nervous system where the swelling may produce sufficient pressure to disturb cerebral function

In older people simple senile emphysema may be suddenly converted into acute obstructive emphysema when endobronchiolar or interstitial edema is created by a superimposed bacterial or viral infection Clinical and laboratory studies suggest that some of the organisms most likely to produce bronchiolar narrowing are Gram negative bacilli such as Friedlander's bacillus the proteus and pseudomonas groups and *Hemophilus influenzae* Diffuse viral disease of the lung may involve the interstitial space throughout large

Another characteristic of infection in older people is that it often creates *functional insufficiency* in organs not directly involved in the infectious process The most frequent illustration of this effect is the mental confusion associated with febrile diseases in the elderly This complication often makes it difficult to elicit from the patient specific symptoms that would help the physician localize the infectious process, as a result, treatment is sometimes directed toward symptoms rather than the basic disease Heart failure and renal failure are other types of functional insufficiency which may become manifest in the presence of fever, even when the heart or kidneys are not directly involved by the infectious process (Hunt 1955)

GENERAL PRINCIPLES OF THERAPY

The Use of Antibiotics

There are certain general principles of therapy that apply particularly to individuals with decreased tolerance to infection *Prophylactic therapy with antibiotic agents should be carefully avoided* except where specific indications (such as the prevention of endocarditis) exist There is scant evidence that administering antibiotics to individuals who are bedridden, paralyzed, or comatose accomplishes more than the conversion of antibiotic sensitive bacterial populations to antibiotic resistant ones (Weinstein, 1955) The use of antibiotics in the routine care of patients with *indwelling catheters or tracheotomy tubes creates more problems than it* solves The prophylactic administration of antibiotics to individuals with chronic pulmonary disease is open to some debate (Helm, *et al*, 1954), but our experience has been that floral shifts occur in prophylactically treated patients, making it extremely difficult to manage acute infections when they arise In institutions housing large numbers of elderly or chronically ill patients it is especially important to avoid the indiscriminate use of antibiotics A serious hazard would be created by the selective survival of antibiotic-resistant staphylococci and Gram negative bacilli, and their spread among patients and hospital personnel

In older people it is preferable to treat each infection as it occurs and as specifically as possible Serious or extensive infections should

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In older people it is preferable to treat each infection as it occurs and as specifically as possible. Serious or extensive infections should

to keep active, since physical activity is one of the most effective aids to the elimination of body secretions and excreta

SUMMARY

1 With advancing age there is a decreased susceptibility to those infectious diseases which confer specific immunity Infections caused by the normal bacterial flora of the body, however, are not usually associated with prolonged specific immunity, and the resistance of older people to these organisms is likely to be decreased by defects in the mechanical and physiologic mechanisms for controlling infection

2 Once an infection of any type is established in an elderly patient it is often tolerated poorly

3 The manifestations of infectious diseases are often somewhat *different in older* people There may be a less pronounced febrile reaction and a greater alteration in the functional reserve of the involved system

4 Since infections in older individuals are most often due to microorganisms that are endogenous or are found in the patient's immediate environment every effort should be made to prevent these organisms from becoming antibiotic resistant The prophylactic use of antibiotics should be avoided and antibiotic therapy should be specifically directed toward a specific infectious process

5 Patients who have acute infections producing inflammatory oedema great enough to interfere seriously with a vital function may be benefited by the administration of corticoid compounds

6 Since the functional reserve of homeostatic mechanisms may be decreased *in* old age, careful attention should be given during infections to the maintenance of normal function *in* the involved system and also in distal systems

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areas, producing marked hypoxia in severe cases A recent report by Rogers (1958) emphasized that influenzal pneumonia without significant complicating bacterial infection may in itself be serious or even fatal In such cases anti inflammatory steroid compounds by reducing the bronchiolar edema, may sometimes be life saving

The most obvious danger in using steroid therapy for infections is the risk of local or distal spread of the infection This risk must be weighed against the deleterious effects of the inflammatory edema The danger that steroid compounds may permit the infection to spread is not as great if the causative agent can be adequately suppressed by an antibiotic Since viruses are not susceptible to antibiotics, the only justification for using steroid therapy in viral infections lies in the fact that virtually all viral diseases, even though they may be manifested primarily by an inflammatory reaction in a single organ, are widely disseminated, hence further spread of the infection is not likely Only in cases of chickenpox developing in children receiving long term steroid therapy for rheumatic fever is such therapy known to have had a harmful effect on the course of a viral infection A word of caution should be given however, about another potential danger associated with the use of steroids in virus diseases Bacterial infections, particularly staphylococcal infections may complicate viral diseases If the patient's downhill course is due to such a complication, therapy with specific antibiotics rather than steroids should be instituted

When the steroid compounds are used in acute illnesses they should be administered in optimum doses until there is definite evidence of response, then the dose should be rapidly reduced, and the drug should usually be discontinued altogether within a week If the infection is bacterial, specific antibiotic agents should be given with the steroids

Since the functional reserve of the kidneys heart lungs brain and liver may be decreased in older people, it is especially important to supplement specific therapy of an infection with general measures intended to support the function of these organs The kidney's selective ability to excrete and retain electrolytes may be impaired and the physician must exercise more care in maintaining the fluid and electrolyte balance Every effort should be made to correct protein and vitamin deficiencies and anemia To the extent that his infectious process allows, the patient should be encouraged

CHAPTER 9

Common Dermatologic Problems In Geriatrics

CHARLES M HOWELL

Dermatologic disorders comprise a sizable part of any general medical practice and are particularly common in geriatric patients The skin is a reactive dynamic organ that is affected by aging as well as by various external stimuli An understanding of the aging processes in the skin is of inestimable value in dealing with elderly patients

ETIOLOGIC FACTORS

The atrophic changes in the skin that result from aging are almost invariably accompanied by progressively increasing *dryness* a basic factor in many of the dermatoses seen in elderly patients

Psychosomatic Factors

The socioeconomic psychologic and physical factors responsible for the development of anxiety in older people are discussed in other chapters of this book. Many dermatologic problems particularly those in which itching is a symptom are aggravated by anxiety and apprehension Some dermatoses such as localized neurodermatitis may be primarily due to stress The sensation of itching produced by dryness of the skin in many old people is intensified by tension and may soon lead to a persistent intensely pruritic dermatosis which is aggravated by continual scratching If the pa

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Allergies

Allergic reactions to food and to medications given orally or parenterally as well as to various external allergens, are common in geriatric practice as in the adult population at large Drugs administered externally or systemically are the most common causes of such allergic conditions Because the skin of older persons is frequently less tolerant to allergens than that of younger individuals the incidence of so called overtreatment dermatitis is high in geriatric patients Among the topically applied drugs most apt to cause trouble are the "caine" group of topical anesthetics (such as benzocaine Nupercaine and Surfacaine) all topical antihistamine drugs sulfathiazole penicillin and Furacin An increasing number of cases of neomycin sensitivity have been described recently Tar preparations while of much value as keratolytic and antipruritic agents should be used cautiously particularly at the beginning of therapy

When any potentially sensitizing topical preparation is to be employed it is usually a good plan to use a prophetic patch test allowing the patch to remain on the skin for 48 hours unless burning or itching is experienced beneath it in such a case it should be removed immediately Definite redness with itching at the end of 48 hours is considered a positive reaction vesiculation indicates an unusually high degree of sensitivity A false positive reaction may result from contact with the adhesive tape If the patient gives a history of previous reactions to adhesive tape cellulose (Scotch) tape may be substituted

Some elderly people are sensitive to various lubricating lotions and creams which they use to relieve the dryness of their skin In some cases the perfume in the preparation may be responsible The resulting dermatitis may be relatively minimal on the extremities and trunk but severe over the periorbital areas of the face Sensitization to hand lotion for example might first produce a pruritic erythematous scaling of the eyelids

The possibility of a generalized drug reaction from orally or parenterally administered medication must always be considered The high incidence of reactions to penicillin is well known A few minutes devoted to asking the patient about prior reactions to peni

tient finds that his skin condition commands attention and sympathy from others around him, the vicious circle of itching and scratching becomes even more firmly entrenched Such a situation calls for patience and resourcefulness upon the part of the patient's family and physician

Neurocirculatory Factors

Alvarez has for years emphasized the relatively frequent occurrence of what he terms "little strokes"—nonparalyzing thromboses of small arteries in the brain Among the symptoms that may follow such small strokes are patches of anesthesia, causalgia, and other paresthesias on the skin or mucous membrane The one that perhaps occurs most commonly is burning of the tongue, or glossopyrosis Any bizzare sensation on the skin or mucous membrane should bring to mind the possibility of a minimal cerebral vascular accident, especially if there is a history of hypertension, dizziness, or unexplained syncope

Nutrition

All too often an unsubstantiated diagnosis of "avitaminosis" is made to explain some persistent involvement of the skin or mucous membrane Happily, the day when such a diagnosis was fashionable has passed While it is true that older people often do not eat an optimum diet, a genuine vitamin deficiency state is relatively rare except in frankly malnourished patients Unfortunately many elderly people waste precious dollars on expensive vitamin preparations, when their money could be spent to much greater advantage elsewhere

The so called nutritional eczema' occasionally seen in older patients is characterized by an eczematoid eruption of the legs and edema of the dependent parts (Waisman, 1957) It is usually associated with hypoproteinemia, which may be dietary in origin, but is often caused or aggravated in patients with exfoliative dermatitis by persistent generalized oozing from the involved skin surfaces Successful management depends on finding the cause of the exfoliative dermatitis and instituting appropriate corrective measures

ago The lessened incidence can probably be attributed to the decreasing use of chewing tobacco and snuff as well as to the marked decline in syphilis Poor dental hygiene and the use of chewing tobacco or snuff are among the known etiologic factors Leukoplakia is often confused with lichen planus involving the oral mucosa The latter condition is characterized usually by a lacy network or by bluish white plaques which most often occur just opposite the molar teeth in addition the pathognomonic cutaneous signs are almost always present The lesion of leukoplakia is usually not reticulated and is pure white rather than bluish white Lewis (1952) has pointed out that the lesion of leukoplakia is fluorescent under the Wood light (filtered ultraviolet light), whereas the mucosal areas involved by lichen planus are not A simple biopsy usually clarifies the diagnosis since both lesions have distinctive microscopic appearances

The treatment of leukoplakia consists in correcting poor dental hygiene and discontinuing the use of tobacco in any form although the response is slow these measures are often effective Recently large doses of water soluble vitamin A administered by buccal absorption have become popular Tablets containing 150 000 units each are dissolved in the mouth two times daily Although this treatment is still somewhat controversial impressive results have been obtained in some cases

Fordyce's Disease Many elderly people become greatly concerned when they discover numerous small yellow spots about the size of a pinhead on the surface of the lips and buccal mucosa opposite the molars While such patients are often very sure that they have cancer these spots actually represent dilated or ectopic sebaceous glands The condition is termed Fordyce's disease although no actual disease process is present If the patient is unduly apprehensive over this condition a biopsy may be performed for his peace of mind microscopic study usually results in a clear cut diagnosis

Aphthous Stomatitis Aphthous stomatitis another common disorder of the oral mucosa is characterized by one or more localized extremely tender ulcerative lesions on the tongue the inner surface of the lips or the gingival or buccal mucosa. These lesions usually run a course of some ten days to two weeks despite treatment or the lack of it Formerly the condition was thought to be

cillin is time well spent. One should be particularly cautious when giving injectable penicillin to a patient with an allergic history, especially a history of asthma. Other drugs that may cause generalized allergic reactions include sulfonamides, barbiturates, and the newer tranquilizing drugs. Some of the last mentioned group, such as meprobamate, may produce a photosensitivity reaction involving predominantly the exposed areas of skin.

DISEASES OF THE MOUTH

A good observer never fails to examine the oral cavity. Lesions of the mucous membranes occur occasionally or frequently in lichen



FIG 9-1 Leukoplakia of the angle of the mouth and buccal mucosa, this is a precancerous condition.

planus, lupus erythematosus, syphilis, drug eruptions, erythema multiforme, and pemphigus Oral lesions may be the first evidence of a systemic disease, such as pernicious anemia or leukemia.

LEUKOPLAKIA. Leukoplakia (Fig 9-1) is fairly frequent in the elderly patient, although perhaps not as common as it was 20 years

patient should be warned to be careful in getting in and out of the tub since the baths make the tub slippery

For itching surfaces a soothing topical preparation such as calamine liniment (N F) or an emulsion of equal parts of lime water and olive oil is frequently helpful Old but effective antipruritic agents are milk of bismuth and simple carbolated vaseline An ointment or lotion containing one eighth to one half per cent of phenol or menthol alone or in combination also helps to relieve itching The older generation called phenol the morphine of the skin Other antipruritic drugs especially the caine drugs and topical antihistamines should be applied with caution This warning is especially applicable to the elderly patient whose skin is potentially more sensitive than that of a younger person

In cases where localized secondary infection is present a topical antibiotic is indicated Bacitracin ointment is useful for this purpose as it seldom causes sensitization As a rule one should never apply topically any antibiotic that might conceivably be needed systemically at some future date Penicillin should never be applied locally If the infection is not well localized or if the process is threatening to spread the systemic administration of antibiotics should be considered

When relatively small areas are involved the local use of hydrocortisone and related compounds often gives dramatic relief from itching and inflammation Some cases do not respond to this treatment however and the cost remains high

PRURITUS

Generalized Pruritus Itching can be said to be an inherent attribute of senile skin Atrophy of cutaneous structures causes diminished oiliness and decreased hydration of the surface and the resulting dryness of the skin gives rise to itching This symptom is usually worse during the winter when sweating is reduced and low humidity results in loss of moisture from the epidermis Frequent bathing in hot water with generous amounts of soap a very common practice among elderly people especially in cold weather is undoubtedly a contributory factor

Pruritus that is evident only during the winter is called *pruritus hiemalis* or "winter itch" This condition characteristically occurs

due to a virus similar to that of herpes simplex. Since the development of viral cultural methods, however, the viral etiology has been questioned, and many authorities now feel that a very definite psychogenic factor is involved. Some patients who are subject to recurring lesions of this type have done well on minimal to moderate doses of phenobarbital, while others have shown improvement on the newer tranquilizing drugs. The fact that a diet containing no citric acid or vinegar sometimes causes improvement suggests the possibility of an allergic factor or a nonspecific irritative effect. In sensitive patients the ingestion of certain foods such as chocolate or seafood can produce small ulcerations of the oral mucosa; in such instances the avoidance of these foods will prevent the development of ulcerations.

DERMATOSES

Principles of Therapy

The presence of an acute inflammation of the skin characterized by blisters, swelling, and exudation demands soothing treatment. When there is oozing as well as burning or itching, moist compresses prepared from sodium chloride, magnesium sulfate, boric acid, or aluminum acetate, each properly diluted, usually offer the most effective method of treatment. Recently some institutions have been using plain tap water with good results. If no infection is present, the dressings should be cool, since pruritus is usually controlled best by cool or even ice cold compresses. Ice should not be applied directly to the skin, but may be put in the basin when the solution is made up. If infection is present, however, the compresses should be warm in order to expedite localization of the infectious process. In order to prevent maceration of the treated skin surfaces, such dressings should be applied intermittently rather than continuously. A good plan is to keep them on the infected areas for 20 minutes to two hours two or three times daily. When the involvement is extensive, compressing may not be feasible. In such cases, colloid baths containing either cornstarch or oatmeal afford a simple method of generalized therapy. A cupful of plain laundry starch or Aveeno (a precooked, preconcentrated oatmeal preparation) to a tubful of warm water makes such a bath. The

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is another common complaint of elderly patients Sensitive skin, excessive sweating, and the adherence of bodily excretions to the skin surface all tend to predispose toward an intertriginous inflammatory process The field is then fertile for the secondary invasion



Fig 9 2 Neurotic excoriations in a woman with deep seated emotional problems

of pyogenic bacteria or yeastlike fungous organisms such as *Candida albicans*

In many cases however, no actual eruption is discernible even though the patient complains of intense itching This condition, which has been termed "essential pruritus," may be produced in various ways In a person who bathes frequently the skin surface

over the lower extremities, and appears as a poorly defined, rough, scaling area, in which multiple linear excoriations may be visible It is aggravated by bathing and by contact with woolen garments The increase in itching invariably noted upon removal of the clothing is explained by changes in the cutaneous circulation and stimulation of the nerve receptors by currents of air

Surprisingly effective relief for itching resulting from simple dryness of the skin can often be obtained by the application of a lubricating film such as petrolatum, olive oil, lanolin, or hydrogenated vegetable oil to retard evaporation and restore moisture Hydrogenated vegetable oil can be obtained at any grocery store or supermarket, and its low cost makes it especially useful when large areas of skin are to be covered This combined hydrating and lubricating effect can be achieved more simply by adding one ounce of a lubricating agent such as olive oil or mineral oil to the tubful of water before every bath

If the condition is severe, soap should not be used Patients with moderate itching might possibly tolerate one of the so called superfatted soaps such as Allercreme (Texas Pharmacal Company) or Dove (Lever Brothers) Bathing should be curtailed appreciably during the winter months, one or two baths weekly may be all that the skin of such patients will tolerate Relatively quick baths in lukewarm water will cause less itching than prolonged baths in hot water Pruritus will also often be less noticeable if the patient dons some covering garment immediately after drying off

Persistent generalized pruritus in the elderly male occasionally responds to oral or intramuscular testosterone, although this treatment is often disappointing Water-soluble vitamin A, 50,000 to 100,000 units daily by mouth, may give considerable relief from dryness and itching of the skin in old people

When no objective cutaneous findings are present to explain persistent itching, systemic diseases should be considered An internal malignancy such as lymphoblastoma sometimes causes itching in elderly patients Other less frequent causes include diseases of the liver and kidneys, diabetes, reactions to drugs such as phenobarbital, cerebral arteriosclerosis, and psychiatric disorders (Fig 9 2) A thorough medical investigation is sometimes necessary before the cause of persistent pruritus is determined

ANOGENITAL ITCHING Persistent itching of the anogenital areas

The pruritic patchy, erythematous lesions of moniliasis develop most frequently in flexural areas, especially beneath the breasts in the obese female and in the groins and gluteal cleft. A topical nystatin containing preparation such as Mycostatin Ointment (Squibb) or 5 per cent ammoniated mercury in hydrophilic ointment is usually effective in the treatment of flexural lesions. All obviously overweight patients should be given a reduction diet, and diabetes must be conclusively ruled out by urinalyses and even glucose tolerance tests.



Fig 9-3 Chronic paronychia of both index fingers owing to *Candida albicans*

Other frequent sites of involvement are the angles of the mouth (so called perleche) and the nails, especially the fingernails. Perleche seldom occurs except when the folds at the corners of the mouth are accentuated by loss of teeth or abnormalities of occlusion. Food particles and saliva tend to collect in the crevices forming a perfect culture medium for the yeastlike organism. This condition is frequently misdiagnosed as "vitamin deficiency." Prosthodontia to restore the normal contour of the mouth is an important part of the treatment for this condition.

Paronychia due to *C albicans* (Fig 9-3) is often seen in house

may become excessively dry, in a person who bathes infrequently, the collection of fecal material and urine may produce itching. Skin tags or hemorrhoids around the anal orifice may cause itching by retaining particles of feces. Proctitis and itching often occur in patients who use laxatives (especially mineral oil) or enemas regularly. A surprisingly common cause of persistent itching of the perianal region is the ingestion of highly seasoned foods. Another possible factor is the use of coarse toilet tissue. Pinworms can cause maddening pruritus of the anal, perineal, and vulvar areas; this usually occurs at night when the parasites migrate. A Scotch tape examination of the anal orifice should be done routinely in all cases of persistent unexplained anogenital itching. When thorough investigation fails to reveal any definite cause for such itching, the possibility of a psychogenic origin must be considered.

FUNGOUS INFECTIONS

MONILIASIS. The most common fungous infection of elderly people is moniliasis, or candidiasis. Because older people often increase their intake of carbohydrates, the amount of glucose in the skin and sweat is increased. Such individuals are also prone to become obese, providing fertile soil for the growth of the yeastlike organism, *Candida albicans*, which is a normally harmless inhabitant of the mouth, the intertriginous areas, and sometimes of the vagina.

Increased degrees of perspiration seem to predispose to the development of this condition, which is often noted first in warm weather. In addition, the oral administration of broad spectrum antibiotics, by changing the intestinal flora, permits the rapid and unopposed growth of *C. albicans*. The complaint of persistent perianal itching in a patient who has had some oral antibiotic during the preceding two or three weeks should always suggest the possibility of moniliasis. In such cases scrapings from the involved skin areas will usually reveal evidence of mycelial elements on direct examination of a slide prepared with 15 per cent potassium hydroxide, and a culture on Pegano-Levin or Sabouraud's medium usually proves the presence of *C. albicans*. The possibility of diabetes should always be investigated in cases of moniliasis, since infections with yeastlike organisms are prevalent in diabetic patients.

Penicillium This drug is given orally usually 250 mg four times daily Results may be almost dramatic although treatment might have to be continued for as long as four to six months in the cases exhibiting nail involvement More information particularly in regard to permanency of cure and possible side effects is needed before the drug can be adequately appraised Griseofulvin is said to be ineffective in C *albicans* infection as well as in the deep fungous infections

STASIS DERMATITIS

Stasis or varicose dermatitis an eczematous eruption affecting the legs below the knees (Fig 9 4) is a common affliction of elderly persons especially those who are obese or who have been in the habit of standing for long periods

There is apparently a familial predisposition to the development of stasis dermatitis just as there is to the formation of varicose



FIG 9-4 S
relat ely no

wives and maids, whose hands are kept in soapy water a good deal of the time Characteristically, redness and tenderness develop in the tissues at the base or at the sides of the nail, and are followed by drainage of a drop or two of pustular exudate When this condition persists, dark green or greenish blue stripes may be seen along the lateral margins of the nail, and the nail surface may become irregular and distorted Other patients may exhibit partial separation of the nail from the nail bed, along the sides and at the distal edge

Soaking the finger in water or saline solution only serves to prolong the fungous infection, since the moist crevices form perfect culture sites for growth of the *C albicans* Perseverance in treatment is of utmost importance A simple but effective regimen includes the use of rubber gloves to avoid exposure to soap and water, and the local application of a 1 per cent alcoholic solution of gentian violet twice daily after soaking the involved fingers in potassium permanganate solution (1 8000) for 15 minutes

DERMATOPHYTOSIS ("ATHLETE'S FOOT") Dermatophytosis is a fungous infection affecting the feet and sometimes the hands It originates as an intertriginous involvement of the interdigital areas, but later spreads to the nails, soles, hands, and groins In the inflammatory type, which is due to *Trichophyton gypseum*, the condition often begins with erythema, soreness, and vesiculation on the sides of the toes and the toe webs, fissuring of the affected skin occurs later Absorption of formed elements may produce a sympathetic inflammatory process (dermatophytid) characterized by vesicles on the sides of the fingers and palms Almost invariably the contents of these small blisters are sterile

The chronic type, which is due to *Trichophyton purpureum*, may also begin between the toes, but is usually characterized by much less inflammation The soles often exhibit scaling, erythema, and thickening The nails frequently are thickened, yellow, and distorted

Treatment is difficult, especially in the chronic type, and overtreatment is all too common Many of the newer fungicidal agents containing fatty acids such as undecylenic and propionic acid are useful as well as relatively nonirritating

The most recent treatment for the superficial fungous infections is griseofulvin, which is a fermentation product of three species of

efficacious in reducing the inflammatory process and in some cases systemic steroid therapy might be justified The longer the duration of such a dermatosis the harder it is to treat successfully Recurrences are common and it is necessary to exercise great care to prevent foci of stasis dermatitis from developing in patients who have had an autosensitization reaction

TUMORS OF THE SKIN

Benign Tumors

Senile lentigines are the freckles of older people These lesions are characterized by brown sharply demarcated slightly raised plaques that may exhibit some degree of scaling on the surface As a rule they appear only on the exposed areas particularly the backs of the hands the wrists and the forearms Senile keratoses often develop on such lesions with the attendant risk of carcinomatous change In rare cases senile lentigo may undergo malignant change to melanoma (melanotic freckle)

Senile keratoses occur predominantly in the exposed surfaces of fair skinned individuals who have been exposed excessively to sunlight in the past The development of such lesions is thought to be associated with damage from sunburn Senile keratoses are usually roughened scaling slightly elevated lesions When the scale builds up a hornlike appearance may be produced The presence of an inflammatory process at the base of any senile keratosis indicates the possibility of malignant change to squamous cell carcinoma Patients with senile keratoses should be cautioned about overexposure to the sun and should apply a lubricating cream to the exposed surfaces once or twice daily

Pigmented nevi (moles) vary markedly in size and appearance They may be located virtually anywhere on the skin surface and may be flesh colored or dark raised or flattened hairy or smooth Usually these lesions appear before middle life but it is not uncommon for new nevi to develop in elderly people

Seborrheic keratoses or *seborrheic verrucae* (warts) appear most frequently in middle age or later although they may be seen in young people They are among the most common cutaneous neoplasms seen in older patients and often cause considerable alarm

veins in the lower extremities Another possible predisposing factor is an injury to the ankle or lower leg that has resulted in persistent swelling of the foot and ankle

Stasis dermatitis usually appears first in the region of the ankle but frequently spreads to the foot and up over the entire leg Secondary bacterial invasion, resulting eventually in ulceration is common

The most important factors in the management of stasis dermatitis are support of the circulation and the prevention of stasis by means of an elastic stocking or bandage properly applied It is important to see that most of the pressure is exerted around the ankle and lower part of the leg, with a gradual lessening of pressure as the bandage is brought up the leg, usually to a point just below the knee If no secondary pyogenic infection is present, sterile vaseline or 2 per cent boric acid ointment may be applied to the areas of dermatitis and covered with a dressing A pad of foam rubber one fourth inch thick may be placed over the dressing and the immediately adjacent normal skin before the elastic bandage is applied this measure often proves very effective in supporting the circulation and preventing stasis When the condition is severe and ulceration has occurred, bed rest with the extremity elevated may be desirable Surgical correction of any prominent varicosities may be necessary

Overtreatment of stasis dermatitis may cause not only local irritation but also an id reaction resulting from systemic absorption of irritating material from the inflamed tissues This may affect the hands, arms, face, and neck, or may even become generalized Topical medications that can produce such an id reaction include antihistamines and antibiotics It is entirely possible also for such an id phenomenon to result purely from the absorption of certain products of protein breakdown from the area of stasis dermatitis The entire skin may become allergic to these breakdown products and react explosively to a relatively small area of involvement This phenomenon, which is frequently seen in elderly patients is called autosensitization In such cases conservative treatment is mandatory No agent should be employed if there is any question concerning the patient's tolerance to it For management of the focus the safest initial measure is elevation of the extremity and the use of warm saline compresses Topical steroid preparations are often

sebaceous adenomas and they are composed of hypertrophic sebaceous glands Their main importance lies in the fact that they are often confused with basal cell carcinomas

Old people often have small *cutaneous tags* about the neck and axillae These may appear as tiny papules or pedunculated brown tags They are especially common in obese persons and may appear immediately after an intertriginous dermatitis has subsided

"*Senile*" *angiomas* also known as cherry angiomas or de Morgan spots are small telangiectatic disturbances of the skin which are



FIG 9 6 Seborrheic keratosis Notice the superficial location of the lesion

quite common in older persons It has been estimated that 75 per cent of all individuals past the age of 30 have senile" angiomas and the incidence increases with age These lesions appear as small red masses composed of tiny dilated vascular loops Diascopic pressure obliterates the spot The lesions are entirely harmless and the treatment of choice is reassurance

Malignant Tumors

Cutaneous cancer is the most common of all malignant neoplasms and the incidence of this condition increases with age By far the largest number of skin cancers is seen in areas where expo

on the patient's part They may be found in virtually any area, although they are most frequently seen on the trunk (Fig 9-5) The neoplasms are so superficially situated that they have been described as resembling drops of beeswax on the skin surface (Fig 9-6). Their color varies from tan to brown or black, and the papule or nodule is covered with a greasy scale that forms a warty eleva-

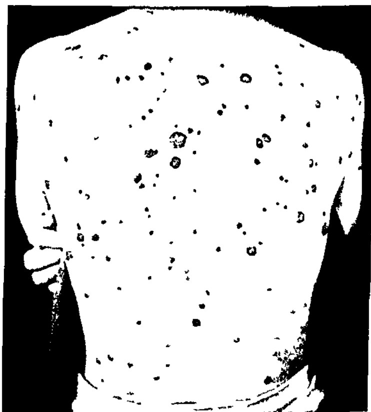


Fig 9-5 Multiple seborrheic keratoses of the trunk The flat lesion on the left lumbar area proved to be intraepithelial squamous cell carcinoma (Bowen's disease)

tion Malignant change is rare Removal of seborrheic verrucae is easily accomplished by scraping the neoplasm off with a dermal curette after the surface has been sprayed with ethyl chloride or Freon 114 The tissue removed may be saved for pathologic study Scarring seldom results from this method

Numerous small, rounded, slightly yellow papules that may be umbilicated are often seen over the forehead and cheeks of elderly persons These entirely benign lesions have been termed senile

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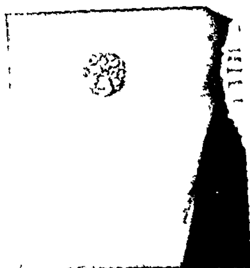


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Malignant Tumors

Cutaneous cancer is the most common of all malignant neoplasms and the incidence of this condition increases with age By far the largest number of skin cancers is seen in areas where expo-

sure to sunlight is greatest In the sunny part of Australia for example the incidence of cutaneous cancer may be as high as 90 per cent of all malignancies Moreover, the exposed areas of the body are involved far more frequently than the covered areas Older people who move to sunny climates after retirement may unwittingly accelerate the development of skin cancer There is no doubt that excessive exposure to sunlight prematurely ages the skin this fact is evident both clinically and microscopically Physicians could do much to reduce the incidence of cutaneous cancer by explaining



Fig 9 7 Squamous cell epithelioma of the rim of the ear this is a frequent site for this neoplasm

to their older patients the risks involved in excessive exposure to sunlight

Squamous cell epithelioma (sometimes referred to as prickle cell epithelioma or carcinoma) is locally invasive and may metastasize to internal organs consequently it is always a dangerous lesion (Figs 9 7 9 8) It may occur anywhere but is most common on the face especially on the lower lip Lesions on the lower lip are seen most often in elderly men most of whom use tobacco in some form Chronic irritation from a pipe or a jagged tooth occasionally seems to be a factor Squamous cell carcinoma sometimes develops from a pre existing senile keratosis (Fig 9 9) In other cases it appears abruptly



FIG 9 8 Squamous cell epithelioma of the dorsum of the hand originating in a chronic ulcer of two years duration A biopsy should be performed on any persistent ulceration no matter where it is located

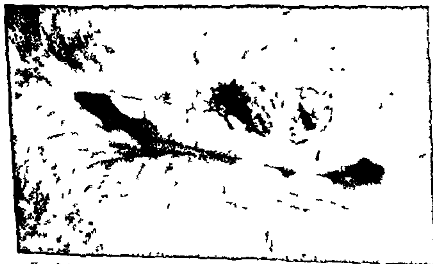


FIG 9 9 Squamous cell epithelioma of the upper lip originating in a senile keratosis this lesion is more frequently seen on the lower lip

The clinical appearance varies greatly. Palpation frequently reveals infiltration. The neoplasm may be raised above the surface of the skin or may be flat, with infiltration beneath the surface; it is extremely difficult to appraise the extent of these latter lesions. A fully developed squamous cell epithelioma frequently shows central ulceration and crusting. By the time this stage is reached, metastases may have occurred, and a careful examination of the regional lymph nodes is imperative. Lesions on the lip and on the tongue or other mucous membranes tend to metastasize rapidly.



Fig. 9.10. Basal cell epitheliomas of the forehead and left cheek; the lesion on the forehead is of the morphealike variety while the lesion on the left cheek is typical of so called rodent ulcer.

Superficial squamous cell carcinoma (Fig. 9.5) or *carcinoma in situ* (also called Bowen's disease) is sometimes confused with psoriasis or other eczematoid dermatoses, and microscopic study may be necessary to make the diagnosis. Some of these patients give a history of having had some arsenical preparation orally or parenterally, perhaps years previously. It is known that administration of arsenic may predispose to the later development of so called arsenical keratoses, principally on the palms and soles. Such keratoses are notoriously prone to undergo malignant change.

Basal cell epithelioma (Fig. 9.10) *is the most easily recognized* and least dangerous of all the cutaneous malignancies. Like squa-

mous cell epithelioma, it is seen most often on the face, although it too can occur anywhere Perhaps the most common form is the raised, rounded, buttonlike type consisting of a firm nodule having a skin colored or waxy appearance The border is elevated and rounded, and umbilication is common Small telangiectatic vessels are often visible on the surface The lesion grows slowly, and it is not unusual to see only moderate growth over a period of several years Central ulceration with crusting frequently supervenes sooner or later

Another fairly common type is the morphealike epithelioma, which may initially suggest localized scleroderma Careful examination under a good light, with the suspected skin area put under tension by the thumb and forefinger, will usually reveal a definite rolled pearly gray border

Multiple flat basal cell epitheliomas often resemble an inflammatory dermatosis such as psoriasis, and biopsy may be necessary for

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does not tend to metastasize, but does locally invade deeper structures including bone Epitheliomas on the nose, around the eyes, and on the ears should be handled very carefully, since the nature of the underlying tissues makes any malignant invasion hazardous

When a squamous cell or basal cell carcinoma is suspected, complete excision (if the lesion is small) or biopsy with pathologic study is indicated Treatment will depend on the size, site, and type of lesion Excision, roentgen irradiation, and electrodesiccation with curettage all have their applications

Malignant melanoma, or melanocarcinoma, *is* an extremely malignant neoplasm It is sometimes termed "the black death" The tumor begins invariably as a junction nevus, and may grow slowly or rapidly The lesion is a flat, nonhairy neoplasm, usually slate-blue to black in color although the so called amelanotic melanoma may be flesh colored Since there may occasionally be considerable growth beneath the surface, accurate appraisal of the extent of a melanotic lesion may be difficult Superficial ulceration with crust formation seldom occurs until the tumor has spread through the lymphatics and blood stream

Any slate blue or black lesion that is increasing in size or exhibiting evidence of inflammation should be viewed with suspicion

Since moles located on the soles, palms, and genitalia are especially prone to undergo malignant change, prophylactic excision of such lesions located in these areas should be considered

Treatment of malignant melanoma is unsatisfactory, and the best hope of cure lies in the early removal of any nevus that is undergoing a change in size or appearance If histologic studies reveal melanoma, wide excision is the treatment of choice Radical procedures such as amputation are seldom justified

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CHAPTER 10

Ocular Problems in Geriatric Practice

R WINSTON ROBERTS

While older patients are subject to virtually all the ocular problems seen in children and young adults there are many diseases and functional problems of the eyes that occur most commonly in the later years Most of these are degenerative disorders but certain types of infections neoplasms and other diseases are also encountered most frequently late in life

DEGENERATIONS AND ABIOTROPHIC DISORDERS OF THE GLOBE

The Conjunctiva

Degenerations of the conjunctiva while seldom of clinical importance are almost universal among elderly patients These changes may be sufficiently conspicuous to be a matter of concern from the cosmetic aspect

PINGUECULA Perhaps the most frequent and important of the benign degenerations of the conjunctiva is the pinguecula This is a yellowish slightly elevated thickening of the bulbar conjunctiva that appears on either side of the cornea in the region of the lid aperture It is composed of *proliferated elastic fibers* hyaline degeneration of the fibrous tissue and amorphous hyaline material and it is thought to be *due to* the combination of exposure and senility It is not infrequently confused with pterygium but unlike pterygium it is quite harmless Treatment is required only in rare instances where the yellowish thickening becomes so prominent as to be disfiguring

CONCRETIONS Of almost equal prevalence are firm, white concretions in the conjunctiva, usually embedded but sometimes slightly elevated These are composed of epithelial debris and products of old infections in conjunctival glands They usually cause no trouble, although they are often the center of a focal redness In some cases, however, the concretions may become elevated above the surface, producing the sensation of a foreign body and occasionally even scratching the globe In such instances they may readily be excised

The Cornea

The cornea is also subject to degenerative changes, which are usually harmless but may affect its transparency and focusing properties

ARCUS SENILIS Frequently with advancing age a yellowish gray ring develops about the peripheral portion of the cornea, composed of particles of lipoid material deposits through the stroma of the cornea It is separated from the periphery by a narrow clear zone, which makes it readily distinguishable from harmful marginal degeneration It never interferes with vision and requires no therapy

PTERYGIUM Pterygium is most prevalent in individuals frequently exposed to the elements, and especially to wind and dust It usually invades from the nasal side of the cornea and almost always begins in the area of a pinguecula From this area there is a triangular encroachment of the conjunctiva upon the cornea, preceded by a zone of gray infiltrate that progresses usually very slowly, from the limbus toward the pupillary center Vision may be impaired by invasion of the pupillary area The substance of the pterygium may become thickened and markedly vascularized The true nature of this condition is still not definitely known but pathologic studies show an invasion of hyaline degenerative tissue and granulation-like tissue into the region of Bowman's membrane, which is partially destroyed and replaced

True pterygium should be distinguished from pseudo pterygium, which is a postinflammatory adherence of the conjunctiva to the cornea, occurring at the site of a marginal corneal ulcer chemical burn, or some other inflammatory process The pseudo pterygium is a bridge of conjunctiva, attached to this abnormal corneal site

The tip of a squint hook can usually be passed beneath it—a maneuver that is not possible with true pterygium

The treatment of pterygium is surgical but recurrence is frequent The use of beta irradiation when recurrence is becoming evident or prophylactically after excision where recurrence is feared has been a major addition to the therapy of this troublesome condition

CORNEAL DYSTROPHIES Degeneration of the corneal endothelium occurs in a large number of elderly individuals This endothelial change is called guttate keratopathy and is considered a precursor of endothelial dystrophy of Fuchs which may progress to opacification of the corneal stroma edema and the formation of bullae in the epithelium

Until very recent years we had no satisfactory treatment for epithelial and endothelial dystrophies Now however keratoplasty with large corneal grafts if performed relatively early in the course of the dystrophy may offer lasting corneal transparency and freedom from the discomfort that accompanies the development of epithelial bullae

Less frequent dystrophic opacifications of the cornea include familial corneal dystrophies which are characterized by deposits of whitish hyalinelike material in the superficial layers of the cornea Corneal grafting has been effective in the treatment of these dystrophies

Band keratopathy is a slowly developing gray band sometimes containing calcium deposits in the exposed part of the cornea in the lid aperture It may rarely occur in apparently normal eyes with advancing age but more often occurs after iridocyclitis or some other disease resulting in phthisis

Marginal thinning of the cornea sometimes to a degree leading to ectasia is a condition occasionally seen in the aged It may rarely lead to visual disturbance or even more rarely to rupture of the globe from relatively minor trauma

The Lens

PRESBYOPIA Of universal occurrence in early middle age is the loss of elasticity of the crystalline lens leading to progressively diminishing range of focusing power or accommodation In many in

dividuals the loss of ability to read small print appears to strike with disconcerting suddenness The use of bifocals or reading glasses to overcome this loss of accommodation should be readily accepted by all who are made to understand that this handicap comes to everyone who reaches late maturity

CATARACTS Few conditions as common as cataracts are so poorly understood While any opacity of the crystalline lens may be technically and accurately called a cataract, only opacification sufficient to produce significant impairment of vision is of practical importance With age, the crystalline lens becomes increasingly less transparent in all of us, but for reasons not clearly understood cataracts develop much earlier in some people than in others In some cases the early and occasionally rapid development of cataracts is unquestionably an inherited trait

There is still no effective medical treatment for cataracts, with the possible exception of some early diabetic cataracts that undergo reversal under hormonal treatment of the diabetes Modern cataract surgery, however, is almost always safe and successful The proper time for cataract surgery depends primarily on the individual patient's need for good vision When the poor vision resulting from the cataracts is proving really troublesome, the patient should be advised to have his cataracts removed Bilateral cataract surgery should be recommended for all patients who have had normal binocular vision, not only because of the advantages of binocular compared to monocular vision, but also in order to avoid the troublesome confusion that often results from the presence of *a remaining clouded eye, even where its vision is very poor*

Retina and Choroid

HYALINE BODIES OF BRUCH'S MEMBRANE (DRUSEN) Among the many degenerative processes affecting the retina and choroid in late middle age and beyond, perhaps the most frequent and least harmful is the development of hyaline or colloid excrescences of Bruch's membrane, or the lamina vitrea Ophthalmoscopically these appear as yellowish white slightly glistening dots or larger circular spots that may be scattered loosely throughout the fundus but tend to form large collections in the region of the macula Since they

seldom cause visual loss, their chief clinical importance lies in the need to distinguish them from hard or waxy exudates

Macular Degenerations Under the term "heredodegeneration of the macula" may be included various types of degenerations of the retina and choroid in the macular area which occur with distressing frequency These degenerations may begin in the young adult period, but are far more common in the latter decades of life They are invariably bilateral, and appear to be virtually always hereditary As a rule, ophthalmoscopic evidence of degenerative change is visible before the patient complains of visual loss While the ophthalmoscopic appearance varies markedly, the usual early picture is a mottling or stippling of the pigment in the macular area with increasing areas of atrophy loss of the foveal reflex increasingly large groupings of pigment and degenerative scar formation The lesion may have a honeycomb appearance, and is often large sharply delimited and virtually round obliterating the entire macular area Arteriosclerotic changes are frequently present in both the retinal and choroidal vessels

The first symptom noted by the patient is usually distortion of vision and th

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magnification for varying periods Eventually however, his central vision may be so greatly diminished as to preclude any discrimination of details Since peripheral vision is never affected by this type of degeneration the patient may be reassured that he will remain able to get around unaided

The pathologic picture is one of degenerative change and then complete dissolution of the retinal elements without glial proliferation or other evidences of any reparative activity The absence of any consistent vascular change suggests that this is a true abiotrophic disturbance of the cells themselves

Angioid Streaks and Disciform Degeneration Another type of degenerative change that occurs in the fundus is characterized by the presence of irregular somewhat jagged streakings of the choroid reddish or reddish brown in color which are called angioid streaks These streaks which vary from only one or two small lines to numerous patterns represent breaks in Bruch s membrane, and

dividuals the loss of ability to read small print appears to strike with disconcerting suddenness The use of bifocals or reading glasses to overcome this loss of accommodation should be readily accepted by all who are made to understand that this handicap comes to everyone who reaches late maturity

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No effective treatment of these retinal degenerations is yet available The patient should be made aware of the usual course of the disease, and assured that, while central vision may be gravely impaired, blindness virtually never results Magnifying devices help these patients to make the most of their eyesight for years after their macular vision has been seriously affected

Degenerations Associated with Retinal Detachment With advancing age deterioration of the peripheral and equatorial portions of the retina, as well as degenerative change in the vitreous body, occurs with increasing frequency This fact may be associated with the increased prevalence of retinal detachment in the older age periods When degenerative change causes the vitreous body to become detached from its normal position filling the posterior segment of the globe, the patient frequently sees recurrent flashes of light followed, in many cases, by the development of a floating, irregular spot or strand in the vision of one eye This phenomenon, which is commonly called Moore's lightning flashes, is virtually pathognomonic of vitreous detachment When abnormal vitreous adhesions to the retina are present, the collapsing vitreous may tear loose a little piece of retinal tissue or open a much larger retinal hole, usually of a horseshoe shape Such frank retinal breaks are usually followed by retinal detachment

Whenever a patient gives a typical history of Moore's lightning flashes, especially if they are followed by a new vitreous floater, the possibility of impending retinal detachment should be considered. If careful study of the fundus through the widely dilated pupil shows any evidence of a retinal hole or break, surgical sealing of this break is necessary to prevent a frank detachment Where frank retinal detachment does occur, it must be corrected by a surgical procedure

The Sclera

Scleromalacia Perforans While mild degenerative disorders of the sclera such as fatty degeneration, hyaline degeneration, and calcification are not rare, they are seldom of clinical importance and usually have few effects other than discoloration of the sclera. In scleromalacia perforans, a disorder more frequent in elderly individuals who have had arthritis, the sclera becomes thin and holes

are most frequently found about the optic disc. They are always *behind* the retinal vessels and should be differentiated from prominent choroidal vessels or ruptures of the choroid. The condition is occasionally associated with the rather rare skin disease pseudoxanthoma elasticum, in which there is a congenital and hereditary malformation of the elastic tissue of the skin. While angioid streaks do not necessarily indicate ultimate visual deterioration, their rather frequent association with disciform degeneration of the macula (Kuhnt Junius degeneration) makes them a serious prognostic sign.

Disciform degeneration characteristically appears as a round or irregularly oval, somewhat elevated, mass in the macular area, which is gray, grayish white, or yellowish in color. It usually begins with the development of deep round hemorrhages in the macular area. As these are gradually absorbed, thickening and organization of the blood and transudate occur in the layers between Bruch's membrane and the neuroepithelial layer of the retina. The result is an elevated mass of scar tissue that causes a permanent, dense central scotoma and the loss of ability to see any fine details. When the central mass is well organized, however, the disease generally progresses little further and peripheral vision is retained.

Circinate Retinopathy. A group of related retinal degenerations now lumped together under the general term "circinate retinopathy" are characterized clinically by the presence of a complete or incomplete ring of white or yellowish white hard looking exudates. These most typically surround the macula, but may include extramacular portions of the fundus and often form a large ring that includes both the disc and the macula. Circinate retinopathy may accompany macular degeneration, diabetic retinopathy, Coats's exudative retinopathy, and subclinical incomplete occlusion of the central venous circulation of the retina. While the central vision may be eventually so impaired that the patient is barely able to count fingers, the disease may progress very slowly. Currently it is believed that all circinate retinal degenerations reflect chronic circulatory inadequacy and anoxia of the retinal elements.

Choroidal Sclerosis. Another infrequent degenerative vascular disease that may markedly reduce vision is choroidal sclerosis. In this condition severe arteriosclerosis of the choroidal vessels is associated with depigmentation and atrophy of the retina.

No effective treatment of these retinal degenerations is yet available The patient should be made aware of the usual course of the disease, and assured that, while central vision may be gravely impaired, blindness virtually never results Magnifying devices help these patients to make the most of their eyesight for years after their macular vision has been seriously affected

DEGENERATIONS ASSOCIATED WITH RETINAL DETACHMENT With advancing age deterioration of the peripheral and equatorial portions of the retina, as well as degenerative change in the vitreous body, occurs with increasing frequency This fact may be associated with the increased prevalence of retinal detachment in the older age periods When degenerative change causes the vitreous body to become detached from its normal position filling the posterior segment of the globe, the patient frequently sees recurrent flashes of light followed, in many cases, by the development of a floating, irregular spot or strand in the vision of one eye This phenomenon, which is commonly called Moore's lightning flashes, is virtually pathognomonic of vitreous detachment When abnormal vitreous adhesions to the retina are present, the collapsing vitreous may tear loose a little piece of retinal tissue or open a much larger retinal hole, usually of a horseshoe shape Such frank retinal breaks are usually followed by retinal detachment

Whenever a patient gives a typical history of Moore's lightning flashes, especially if they are followed by a new vitreous floater, the possibility of impending retinal detachment should be considered If careful study of the fundus through the widely dilated pupil shows any evidence of a retinal hole or break, surgical sealing of this break is necessary to prevent a frank detachment Where frank retinal detachment does occur, it must be corrected by a surgical procedure

The Sclera

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INFLAMMATORY DISORDERS OF THE GLOBE

While geriatric patients may suffer any of the infections and inflammatory diseases of the globe that are seen in other patients, certain inflammatory disorders are sufficiently characteristic and frequent in this age period to deserve special attention

The Conjunctiva

CHRONIC CATARRHAL CONJUNCTIVITIS This usually minor inflammatory reaction is extremely prevalent in elderly patients The eyes burn and show persistent or recurrent redness, sometimes accompanied by a scanty, stringy discharge Scrapings from the conjunctiva may reveal no organisms, but nonhemolytic or hemolytic *Staphylococcus aureus* can often be grown In cases where the conjunctivitis is chiefly a marginal irritation, maximal about the outer corners of the conjunctivae and usually associated with maceration and scaling of the lids in this region, the Morax-Axenfeld bacillus can occasionally be found If no specific organisms are found, it is very important to look carefully, with the aid of magnification, for ingrowing cilia that may be rubbing against the globe, and also for concretions or cilia impacted in the lacrimal puncta

PSEUDO MEMBRANOUS CONJUNCTIVITIS While elderly patients may occasionally be afflicted with pseudo membranous conjunctivitis caused by streptococci or staphylococci, they are much more often subject to a pseudo-membranous type of infection produced by Gram negative organisms of the coliform group These infections may be particularly chronic and resistant to treatment

In all these types of conjunctivitis an attempt should be made to identify the causative organism, so that the appropriate antibiotic or chemotherapeutic agent may be used It is important to treat any concurrent infection of the lid margins Since infections of the conjunctiva are often recurrent in elderly patients, special consideration should be given to the dangers of causing sensitization to the drug used Drugs not usually used for systemic infections and relatively nonallergenic should be chosen It is particularly important

to avoid the use of topical penicillin Highly soluble sulfonamide preparations such as sodium sulfacetamide and Gantrisin are perhaps most desirable Among the antibiotics, chloramphenicol, used either in solution or as an ointment, and combinations of bacitracin, neomycin, and polymyxin are very useful

The Cornea

Marginal Keratitis Marginal infections of the cornea are frequent in elderly patients They may cause yellowish infiltrates just within the corneal limbus, with injection of sectors of the episcleral and conjunctival vessels in the area of these infiltrates Subepithelial corneal abscesses may form, often becoming excavated marginal ulcers that may include much of the corneal circumference Such abscesses *are most commonly associated* with chronic staphylococ [illegible]

[illegible] antibiotics to which the staphylococcus is not resistant Careful attention must be given to the lid margins, and the drugs should be used in the conjunctival sac In many instances desensitization with staphylococcus toxoid is helpful in preventing recurrences

Neuropathic Keratitis Another inflammatory disease of the cornea especially *common* in old age is neuropathic keratitis Perhaps the two most important causes of this disorder in geriatric patients are trigeminal neuralgia and herpes zoster of the ophthalmic branch of the fifth *nerve The* corneal changes associated with herpes zoster like the other ocular manifestations of this disease, are likely to be seen when the nasociliary branch of the ophthalmic division of the fifth nerve is involved During the active phases of the disease diffuse edema of the corneal epithelium is likely to be present but the most characteristic lesions are nodular, subepithelial infiltrates involving the superficial layers of the corneal stroma and looking much like little *snowballs* The epithelium overlying these nodular infiltrates often breaks down into superficial ulcers This keratitis is frequently very persistent, and in some cases leaves permanent opacities

An effective method of treating herpes zoster still has not been found Perhaps the most valuable specific treatment for its ocular

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episcleral tissues, with a gelatinous type of edema. Corneal involvement of a sclerosing type often occurs, and there is usually severe uveitis. While the etiology is often obscure, this type of scleritis may accompany tuberculous infections or collagen disorders. In many cases it runs a fulminating course leading to loss of the eye.

If a specific infection like tuberculosis can be implicated, specific therapy with antibiotic and chemotherapeutic agents should be vigorously employed. In the majority of cases, however, the use of ACTH or steroids, both topically and in large doses systemically, offers the best chance of preserving the eyes.

The Uveal Tract and Retina

Inflammatory diseases of the uvea and retina are not prominent afflictions of the elderly, and in general do not differ from those seen in younger patients.

IRIDOCYCLITIS Perhaps the most common type of uveitis in geriatric practice is nongranulomatous iritis or iridocyclitis, seen as an accompaniment of joint disease, usually some form of rheumatoid arthritis. The usual picture is that of a red, painful, light-sensitive eye. The vision may be only slightly reduced or may be very hazy. The chief condition to be considered in the differential diagnosis is acute congestive closed angle glaucoma.

Iridocyclitis of this type is now managed, successfully in most cases, by frequent topical applications of steroids, together with atropine to prevent the formation of adhesions between the iris and the lens capsule. Salicylates are often given by mouth for their nonspecific effect on inflammatory reactions of this type. Where topical applications of steroids are not adequate, the systemic administration of corticotropin, cortisone, hydrocortisone, or some related steroid is necessary. In the presence of posterior uveitis or chorioretinitis, the topical appl[illegible] they must always be gi[illegible] for the causative process [illegible] be determined [illegible]

GLAUCOMA

No ocular problem is of greater importance in the older age groups than the glaucomas, which have as one of their most promi-

complications is the use of immune serum or blood taken from a recent victim of herpes zoster. For the corneal lesions themselves the topical use of steroid solutions appears to minimize pain and corneal damage, an effect that is in direct contrast to the exaggeration of the trouble seen from the use of steroids in herpes simplex infections

The neuropathic keratitis associated with trigeminal neuralgia appears to be a trophic change and is usually seen after excision or injection of the ganglion for tic douloureux The cornea, in addition to losing its sensitivity, appears to undergo changes resulting in abnormal cellular metabolism The result is punctate stippling and haze of the corneal epithelium, which may progress to exfoliation or vesiculation, and possibly to eventual necrosis

The ideal treatment for this type of neuropathic keratitis occurring after treatment for trigeminal neuralgia is prophylactic In some cases the cornea can be kept intact by the use of lubricating solutions such as methyl cellulose, but in many cases a tarsorrhaphy must be performed to protect the cornea by covering it completely or partially with the lids

The Sclera

Nodular Episcleritis This disease is seen chiefly in older people and is usually associated with gout or arthritis A red or purplish nodule, attached to the sclera, develops rapidly in the episcleral tissues It is tender and painful and may run a recurrent course lasting some weeks At times it is associated with deeper inflammation of the sclera, which may affect a large segment of the globe, producing dark red injection, edema, and tenderness Uveitis is sometimes associated with this type of scleritis

The first step in treating nodular episcleritis and benign scleritis is to treat the associated systemic disease, if effective therapy is available In addition, however, the use of steroids is helpful In many cases frequent topical applications of steroids are adequate to control the inflammation, but if they fail, systemic steroid therapy will usually be effective Salicylates are also helpful in controlling symptoms

Brawny Scleritis This is a much more virulent form of scleritis occasionally seen in elderly patients It is characterized by fulminating, diffuse inflammation and swelling of the scleral and

are self limited producing brief episodes of somewhat hazy vision transient headaches and often the classic observation of colored haloes about lights Diagnosis of closed angle glaucoma in its sub acute stage is confirmed by the use of provocative tests that dilate the pupil such as placing the patient in a completely dark room for an hour or administering a mild mydriatic.

Closed angle glaucoma is perhaps the most satisfactory type of glaucoma to treat The intraocular tension must be lowered quickly, if possible by the use of potent miotics such as strong solutions of pilocarpine frequently administered or combinations of physo stigmine and an acetylcholine drug such as Mecholyl or Carcholin (carbamylcholine chloride) If the use of miotics plus sedation does not reduce the intraocular tension oral or parenteral adminis tration of Diamox (acetazolamide) will help by suppressing aque ous formation

When the intraocular tension has been brought to normal or as nearly so as possible surgery should always be done Since the an atomic potentialities of angle closure are bilateral operations should be performed on both eyes In most cases peripheral iridec tomy will give lasting protection against the danger of further con gestive attacks In cases of subacute closed angle glaucoma pro phylactic iridectomy should be done to prevent acute congestive episodes Only in the patient with a short life expectancy should one rely on the continuous use of miotics to prevent future con gestive episodes for such episodes occasionally occur even when miotics are being used

Simple Glaucoma This type of primary glaucoma is of much greater clinical importance than closed angle glaucoma not only because it is four to five times more frequent but particularly be cause the patient seldom has symptoms until his vision has been severely damaged The insidious nature of this disease makes it mandatory for all physicians especially those dealing with older patients to be constantly on the lookout for it

The classic signs of simple glaucoma are cupping or glaucoma tous atrophy of the optic discs characteristic reduction of the visual fields and elevation of the intraocular tension which is usually of such minor degree that it can be appreciated only by careful measurement with a tonometer If all internists and general practitioners would become familiar with the use of the tonom

nent features an elevation of the fluid pressure in the eyeball They are among the leading causes of blindness in the United States Various glaucoma detection studies on unselected groups of the population suggest that the incidence of glaucoma in the population above the age of 40 is at least 2 per cent Since the blinding potential of this group of diseases can be greatly reduced by early diagnosis and treatment, it is important for all practitioners of medicine to maintain a constant watch for new cases, so that they can be treated before the condition has progressed too far

The glaucomas include primary glaucoma, in which the elevation of intraocular tension appears to be of itself a disease process or part of a disease process, in the globe, and the secondary glaucomas, in which the elevation of intraocular tension is secondary to some other ocular disease such as an inflammatory process, trauma or a neoplasm Primary glaucoma is by far the more important of the two major categories It includes two distinct types closed or narrow angle glaucoma, and simple glaucoma or glaucoma simplex

CLOSED ANGLE GLAUCOMA This form of glaucoma is the type usually referred to by the word "glaucoma" In this condition drainage of the aqueous humor is blocked by apposition of the iris to the posterior surface of the cornea This type of blockage occurs only in eyes in which there is anatomic narrowness of the chamber angle, narrowness that characteristically increases with advancing age When the chamber angle is blocked and aqueous drainage is stopped, fluid pressure builds up rapidly, and alarming heights may be reached in a short time Thus the typical picture of closed angle glaucoma is the clinical entity known as acute congestive glaucoma

In this condition there is a rather sudden onset of headache, severe pain in the eye, blurring of the vision, frequently severe nausea and vomiting, and often profound prostration The cornea is hazy and the pupil is dilated In addition there is marked hardening of the globe, which can usually be detected readily by finger palpation Acute congestive glaucoma constitutes one of the major emergencies in ophthalmic practice, since it causes permanent and irreversible damage to the vision unless the intraocular pressure is reduced within a short period

Closed angle glaucoma may also occur in a subacute, virtually subclinical form In this form the angle closure is incomplete, and the increases in intraocular tension are much less pronounced and



Fig 10 1 Senile ectropion Lid sagging is accompanied by drying and excoriation of the conjunctiva



Fig 10 2 Senile spastic entropion Inward rolling of the lower lid causes the cilia to rub against the globe

eter, many more cases of glaucoma would be detected in the early stages. *Certainly any patient with unusual cupping of the discs should have an ophthalmologic examination to determine the presence or absence of glaucoma.* If the disease cannot be definitely excluded, *repeated examinations must be done until the diagnosis is confirmed or disproved.*

Like the other types of this disease, simple glaucoma should be treated *by an ophthalmologist. The current trend is toward medical treatment of simple glaucoma,* either with miotics alone or in conjunction with Diamox, with surgery to be resorted to only when medical treatment is not effective. Repeated evaluations of the visual fields are necessary to determine the efficacy of treatment. If it is impossible to prevent deterioration of the visual fields by medical means, surgery should be used in all patients except those with a short life expectancy.

Secondary Glaucoma. The eye tolerates secondary glaucoma far better than primary glaucoma. Consequently, therapy should be directed chiefly at the primary disease process, which is most often uveitis. Atropine rather than miotics is usually the drug of choice, and if the tension rises to alarming levels Diamox may be used to reduce it until the primary disease can be brought under control. If the glaucoma persists after the primary disease becomes quiescent, surgery usually is required.

DISORDERS OF THE OCULAR ADNEXA

The Lids

Of all the structures about the eye, none are more prone to develop *senile disorders, usually of a degenerative nature,* than the lids.

Ectropion and Entropion. Ectropion, a very common condi*tion in older people, is characterized by sagging and eversion of* the lids, particularly the lower lid. There may be merely slight eversion of the lid border, most often affecting the inner portion and thereby everting the lacrimal puncta; but the sagging and eversion may be sufficient to expose almost the entire lower conjunctival sac. Senile ectropion is usually entirely dependent upon loss of tone in the tissues of the lids (Figs. 10-1, 10-2).



FIG 10-1 Senile ectropion Lid sagging is accompanied by drying and excoriation of the conjunctiva



FIG 10-2 Senile spastic entropion Inward rolling of the lower lid causes the cilia to rub against the globe

In entropion, which is perhaps even more frequent in elderly patients, there is a tendency for the lid margins to sag or roll inward thereby permitting the cilia to rub against the cornea and bulbar conjunctiva This condition often leads to severe erosion of the corneal endothelium and a chronic conjunctivitis, and causes marked ocular disability from persistent watering of the eyes and difficulty in holding the eyes open

Surgery is indicated in the treatment of both these conditions and is extremely effective in correcting them

Trichiasis A common and very troublesome disturbance of the cilia is the aberrant and irregular growth of the lashes, which we call trichiasis The lashes, instead of being arranged in an orderly fashion pointing outward, point in any and all directions Many of them point inward and rub against the globe, producing chronic irritation and disability comparable to that seen in entropion Trichiasis is most often the result of chronic blepharitis or infection of the lid margins, with consequent malformation of the hair follicles and glands

In some cases trichiasis can be relieved by appropriate chemotherapeutic or antibiotic treatment of the blepharitis, sometimes combined with desensitization therapy or the topical use of ophthalmic corticosteroid preparations If entropion accompanies trichiasis, as is often the case, surgical relief is necessary. In a great many cases the hair follicles must be destroyed by electrolysis

Blepharospasm A functional disturbance most common in old people is the habit spasm of the orbicularis muscles known as blepharospasm a squeezing and winking of the eyelids, which may become so severe that the patient cannot hold his eyes open enough to do any useful work In many cases the blepharospasm is started by a condition that irritates the cornea or conjunctiva, but almost always it is perpetuated largely by the functional component

Any source of irritation about the lids or eyes must have careful attention, but relief of this condition depends chiefly upon sympathetic and patient psychotherapy, supplemented by mild sedation

Ptosis Although *congenital* ptosis is seen in infants and children, *acquired* drooping of one or both lids is most common in elderly patients The drooping of the lids may be dependent upon a palsy of the third nerve, but there are two other important causes

of ptosis. These are myasthenia gravis and senile myopathy, which is prone to affect the levator of the lid (Fig. 10-3) Although poorly understood this condition might be called abiotrophic ocular myopathy In the older age group the most frequent cause of ptosis owing to third nerve palsy is a vascular accident in the brain If the stroke is small, recovery of function can usually be expected in time Other neurologic disturbances, such as the demyelinating disorders or intracranial neoplasms must be ruled out

The differential diagnosis between myasthenia gravis and abiotrophic myopathy may sometimes be difficult Myasthenia gravis is perhaps more likely to undergo spontaneous remissions and to



Fig. 10-3 Ptosis from senile myopathy There is complete loss of muscular tone on the right partial loss on the left

show marked variation in severity during the day Often there are associated palsies of extraocular muscles that cannot be fitted into any cranial nerve pattern The greatest help in differentiating myasthenia both from third nerve palsy and from abiotrophic myopathy is the use of test doses of Prostigmin—or better still Tensilon which will usually produce immediate and dramatic clearing of the ptosis if it is due to myasthenia

Senile abiotrophic ocular myopathy may also undergo variations in severity at various periods depending chiefly upon fatigue and the patient's state of well being Other

surgical correction by a shortening of the levator of the lid or the use of a frontalis sling procedure is warranted.

SENILE ATROPHY AND BLEPHAROCHALASIS. These two conditions, which are similar and which doubtless overlap to some degree, become increasingly frequent in old people. With senile atrophy the skin of the lids becomes dry, inelastic, and baggy, leading to unsightly pouches in the lower lids and to sagging folds of skin in the upper lids, which may even hang over the cilia and interfere with vision. Blepharochalasis, on the other hand, is a poorly understood disorder, possibly of allergic origin, in which the fat and skin of the



FIG 10-4. *Xanthelasma. Harmless but unsightly deposits in the lids are sometimes of psychologic importance to the patient.*

upper lid undergo inflammatory change and swelling, followed by degenerative change; the result is excessive pouching and skin flaps, particularly of the upper lids.

In both of these disorders the primary concern is cosmetic, unless the excess flaps of skin and tissue actually interfere with vision. Most cases can readily be corrected by rather simple plastic surgery.

XANTHELASMA. These elevated, yellowish, cheesy-looking masses in the lids become increasingly prevalent with advancing age. Their appearance is often associated with a high level of cholesterol in the blood, and a low cholesterol diet may sometimes help prevent their further development (Fig. 10-4). Treatment otherwise consists in simple excision of these masses if the patient becomes sufficiently disturbed about the cosmetic blemish which they cause. Unfortunately they often recur.

The Lacrimal Apparatus

KERATOCONJUNCTIVITIS SICCA A fairly common disorder of the lacrimal glands in the later years particularly during the menopausal period in women is keratoconjunctivitis sicca It is characterized by a deficiency of lacrimal secretion both quantitative and qualitative which leads to dryness scratchy irritation and chronic redness of the eyes and to stippling and at times desquamation of the corneal epithelium Actual rolled up filaments of epithelium may be seen hanging on the corneal surface (hence the term filamentous keratitis) and there is a characteristic dry, stringy, adherent discharge in the conjunctival sac A diagnosis can usually be made on the basis of the clinical findings and supported by filter paper measurement of the lacrimal secretions

The usual treatment for keratoconjunctivitis sicca is the use of tear substitutes The best of these seems to be methyl cellulose *in a* ? *to 1* per cent solution to which an antibiotic such as chloramphenicol may be added if there is secondary infection If the disorder is very severe and does not show the usual improvement seen in most cases over a period of a few years the lacrimal puncta may be sealed with a heated probe or cautery in order to utilize more completely what lacrimal secretion may be present

CHRONIC DACRYOCYSTITIS Dacryocystitis occurs frequently at both extremes of life in the elderly and in newborn infants The patient may initially have an acute episode of dacryocystitis often associated with an upper respiratory infection and characterized by pain redness and swelling about the lacrimal sac This condition may lead to frank cellulitis or abscess formation The acute episode can be controlled by the use of antibiotics local compresses and irrigations and where necessary incision and drainage of the lacrimal abscess When the infection is sufficiently controlled [illegible]

the pas [illegible]

most un [illegible] dacryocystitis

In many instances however the swelling and inflammation associated with acute dacryocystitis lead to scarring that causes permanent stenosis of the nasolacrimal passage As a result of the poor drainage from the lacrimal sac a chronic or subacute infectious process tends to develop in the lacrimal passage, causing

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continuous spilling of tears from the involved eye and continuous or recurrent formation of infected mucus or pus in the lacrimal sac In time the sac may become greatly dilated, and recurrent cellulitis and pain frequently result

Since the basic difficulty in chronic dacryocystitis is obstruction of the nasolacrimal passage, with resulting loss of drainage of the lacrimal sac, therapy should be directed toward re establishing such drainage by surgical means Removal of the lacrimal sac is seldom justified, since such an operation leaves the epiphora un relieved, although it may remove the infected site

NEOPLASMS

Benign Tumors of the Globe Benign tumors of the globe seen most frequently include nevi and benign melanomas, both of the conjunctiva and sclera and of the choroid Questionable external pigmented spots or masses can usually be excised for biopsy, while those in the fundus can simply be observed where any doubt about their benign nature exists

Inclusion cysts of conjunctival glands are not uncommon in elderly patients When these cause discomfort, they may readily be punctured with a knife point If they reform after this pro cedure, they should be excised

Benign Tumors of the Lids Benign neoplasms of the lids are very frequent in elderly individuals The most important of these are papillomas and nevi, or moles When these have been present for long periods without apparent change in their size and appear ance, they may be left alone unless they are cosmetically or psy chologically disturbing to the patient Whenever they show growth or pigmentary change, excision is advisable

Malignant Tumors of the Globe Only two malignant tumors of the globe need be mentioned in a discussion of geriatric prob lems The more important of these is malignant melanoma of the choroid This tumor usually makes its presence known first by loss of vision resulting from detachment of the retina In addition, uni lateral glaucoma, persistent low-grade uveitis, and eventually cata ract may develop in the affected eye In the presence of unilateral cataract, malignant melanoma should be considered as a strong possibility Where the fundus can be visualized, careful ophthalmo

scopic examination, combined with transillumination, will usually make the diagnosis evident

Metastatic carcinoma is far less frequent It usually gives somewhat the same picture as malignant melanoma, although glaucoma and cataract seldom develop, possibly because most patients do not live long enough Carcinoma metastatic to the choroid usually originates in either the lung or the breast, and may make its appearance years after treatment of the primary tumor Diagnosis is usually made by ophthalmoscopic observation of a dense, whitish mass in the choroid associated with loss of vision



Fig 10 5 Epithelioma of the lid Its location at the inner canthus makes surgical removal difficult radiation desirable

The treatment for malignant melanoma is prompt enucleation as soon as the diagnosis can be established Enucleation is seldom indicated for metastatic carcinoma, since it points toward widespread dissemination of the primary tumor

Malignant Tumors of the Ocular Adnexa The malignant lesions most frequently seen about the eye are epitheliomas of the lids Most of these are of the basal cell type and offer excellent opportunity for cure by surgical excision Since in their early stages they are often indistinguishable from benign papillomas, biopsy should be done on any mass showing change or growth Malignant melanomatous change may occur also in moles or nevi about the lids and particularly on the lid margins In the case of pigmented tumors biopsy usually should include complete removal of the pigmented mass (Fig 10 5)

Surgical excision is the treatment of choice for malignant lesions on the lids. Where surgery is for any reason contraindicated, radiation therapy is indicated, particularly for the basal-cell epitheliomas.

MALIGNANT TUMORS OF THE ORBIT. Malignant lesions of the orbit are not rare in elderly people. The presenting sign is usually the development of unilateral proptosis, with diplopia. The most frequent tumors are carcinomas that have invaded the orbit by metastasis or by direct extension from nearby primary sites Lymphomas are not uncommon.

Carcinomas involving the orbit by direct extension may often be successfully treated by exenteration of the orbital contents and other tumor sites. Lymphomatous infiltrates should usually be treated by radiation.

NEUROLOGIC OCULAR PROBLEMS

Certain types of neurologic disorders that affect the vision and ocular apparatus are fairly common in the older age period.

EXTRAOCULAR MUSCLE PALSIES AND DIPLOPIA. Perhaps the most frequent ocular disturbances seen in the later years are caused by "strokes" affecting the nucleus of the third, fourth, or sixth cranial nerve in the brain stem. Palsies of one or more of these nerves may result, causing diplopia, which in some cases is present only in certain directions of gaze, but in severe cases is constant and accompanied by gross paralytic strabismus. Careful evaluation of the extraocular movements and study of the diplopia fields usually make it possible to determine which cranial nerves are involved, thus helping to locate the lesion in the brain.

While treatment should always be directed toward the primary disease process, attention to the diplopia will often help the patient over a difficult period. Both his diplopia and his lack of orientation in space can be overcome by keeping one eye covered. The cover should be alternated from one eye to the other. It is important for the patient to use his paralyzed eye in order to avoid, if possible, contractures of the paretic muscle's antagonist, since in most cases function is regained, at least in part. If the return is insufficient or the contracture too severe to permit binocular function, surgery on the extraocular muscles is helpful.

Optic Neuritis and Atrophy Optic neuritis is by no means rare in the older age period This disorder causes rapid and often very marked loss of vision and a characteristic central scotoma is invariably found The size and density of the scotoma increase with the severity of the visual loss

The demyelinating disorders are of major importance as causes of optic neuritis Multiple sclerosis is sometimes seen in elderly patients but the disorder most characteristically associated with optic neuritis in the aged is neuromyelitis optica or Devic s disease In this condition the optic neuritis usually leads to extreme and often permanent visual loss and is associated with cord symptoms though these are not always present simultaneously with the optic neuritis Additional etiologic processes that must be considered include nutritional deficiencies toxic neuritis and certain infections such as syphilis Optic atrophy is frequently seen as a sequel of optic neuritis

Except in the forms of optic neuritis associated with syphilis and deficiency states treatment is disappointing In some cases massive intravenous doses of corticotropin may be effective if given very early in the course of the disease Where deficiency disease is the cause of optic neuritis large doses of vitamin B complex usually produce marked improvement and where the condition is due to syphilis of the central nervous system specific therapy is usually effective

Visual Loss of Central Origin Occasional patients may complain of intermittent or gradual failure of vision that is central in origin In some cases such visual failure may be the forerunner of a major "stroke" Transient unilateral loss of vision associated with headache and pain in the eyes often gives warning of impending thrombosis of the internal carotid artery

Bell s Palsy Temporary paralysis of the facial nerve which is said to be due to inflammation within the stylomastoid foramen is seen rather frequently in older patients The most serious consequences of the paralysis result from exposure of the eye which may lead to epithelial erosion and corneal ulcers Treatment should be directed toward the prevention of these eye complications by the use of lubricating solutions such as methyl cellulose If the facial paralysis is very severe the lids may temporarily be sutured together to protect the cornea

RETINOPATHIES

Nothing within the realm of ophthalmoscopy is more useful or important to the medical practitioner than an understanding of the retinopathies. A retinopathy may be defined as a characteristic group of pathologic changes in the retina that result from circulatory inadequacy. The changes of retinopathy include edema, hemorrhages, exudates or transudates, and papilledema. These changes may result from complete occlusion of the venous or arterial circulation in the retina, from slowing of the circulation within the narrowed lumen of the vessels in patients with hypertension and arteriosclerosis, from changes in the vessel walls themselves, or from changes in the blood itself. There is perhaps no other way in which the general circulation can be as effectively studied as by actual observation of the retinal and choroidal circulation with the ophthalmoscope, and accurate evaluation of the changes observed is a clinical aid that cannot be valued too highly.

HYPERTENSION AND ARTERIOSCLEROSIS. The largest and most important group of vascular changes that lead to retinopathies are those associated with hypertension and arteriosclerosis. Before the actual pathologic changes of retinopathy make their appearance there is usually evidence of changes in the retinal vessels. The retinal changes associated with hypertension are similar, whatever the cause of the elevated blood pressure. Hypertension initially produces diffuse narrowing of the arterioles, whose diameter is normally two thirds to three fourths as great as that of the branches of the central vein of the retina. This narrowing is especially noticeable in the main branchings near the discs. Diffuse narrowing of the arterioles may be considered to represent active but moderately stable hypertension such as might accompany chronic glomerulonephritis, the degree of narrowing being roughly proportionate to the severity of the hypertension.

Where the hypertension is in an active progressive phase, as in severe essential hypertension or toxemia of pregnancy, the arterioles are apt to show focal spasm, which may produce marked segmental contraction. Narrowing at the points of spasm is sometimes sufficient to obliterate the visible blood column. When hypertension enters this active progressive phase, retinopathy usually follows soon afterward with the appearance of retinal edema, hemorrhages and

fluffy, white, "cotton wool exudates or transudates When papilledema makes its appearance, the hypertension has usually entered a malignant phase

Arteriosclerotic change in the blood vessels is to a certain extent a part of the aging process in all of us With the thickening of the vessel walls there develops an increase or widening of the light reflex from the blood column flowing through the artery, increasing tortuosity of the arterioles (especially the small terminal ones, which may develop a corkscrew appearance), apparent change of color of the blood vessels, and lastly and perhaps most important arteriovenous constriction or compression at the crossings This apparent compression of the vein when it crosses beneath the artery is seen as a small zone on either side of the artery in which the vein apparently disappears It is frequently associated with venous dilatation distal to the crossing and marked angulation at the crossing. It may best be explained as resulting from loss of transparency of the vessel walls, especially where the artery and vein share a common adventitial coat at the crossing As these vessel walls and shared coats become sclerosed and opaque, the blood column can no longer be seen through them The wideness of the zone of disappearance and the amount of angulation at the crossings are usually *proportional* to the degree of arteriosclerosis present

When arteriosclerotic changes occur *prematurely* or early in old age they may be *considered* the result of excess wear and tear on the vessel walls, which usually *results* from hypertension The narrowing and spastic change produced in the arterial walls by short bouts of essential hypertension may be entirely reversible, but if the hypertensive episodes are prolonged or severe, organic changes in the vessel walls will inevitably result Careful evaluation of the ophthalmoscopic findings can be of inestimable value in determining the prognosis and the necessity for active therapy in hypertensive cardiovascular disease

Atherosclerotic plaques or sheathings, often localized to a given branch of the arterioles, are occasionally seen in the retina Such organic changes are doubtless comparable to focal [illegible] sclerosis in the [illegible]

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When the gradually developing venous occlusion results from progressive organic thickening of the vessel wall, little benefit is obtained from any therapy Some of these venous occlusions, however, are thrombotic in nature, perhaps resulting from focal phlebitic change In such instances anticoagulant therapy may lead to virtually complete return of vision It is usually impossible to tell, without a trial, which cases will respond to anticoagulant therapy Where response is good such therapy should be continued for long periods with careful attention to the prothrombin level of the blood

Hypertensive changes in the fundus should always be watched for in cases where collagen disease, especially periarteritis nodosa or temporal arteritis, is suspected In approximately 25 per cent of the cases of temporal arteritis, blindness eventually develops as a result of central arterial occlusion If temporal arteritis is recognized before the visual loss occurs, the vision can be protected by prolonged therapy with corticosteroids

Diabetic Retinopathy Perhaps no condition produces such a characteristic retinopathy as that associated with diabetes mellitus The appearance of retinal changes seems to bear no direct relation to the duration or the severity of the disease In some patients with diabetes of relatively marked severity as judged by the blood sugar level retinopathy does not develop over a period of many years On the other hand, severe retinopathy may develop in cases that show only a minimal elevation of blood sugar but are characterized by a marked vascular component The earliest and most characteristic changes are tiny red spots and small round hemorrhages found chiefly in the area between the temporal vessels The spots represent little aneurysmal dilatations of the terminal venules or capillaries which may rupture and bleed, to form larger round hemorrhages in the layers of the retina beneath the nerve fibers In many cases there may also be found hard looking and sharply demarcated small yellowish white to white exudates These consist of colloid or hyaline material with some lipoids also present Arteriosclerotic changes in the vessels also appear in a high percentage of diabetics

Later changes include hemorrhages that rupture into the vitreous, and preretinal hemorrhages with a characteristic boat shape Ultimately proliferation of veillike glial or connective tissue out into

result of degeneration in the retina caused by chronic anoxemia or by occlusive phenomena

VASCULAR OCCLUSIONS While occlusions of the retinal circulation and particularly of the veins are common with arteriosclerosis they occasionally occur when no obvious vascular disease is present The retinopathies seen with vascular occlusions are divided into two main types, depending on whether the occlusion is arterial or venous

The typical arterial occlusion involves the central artery of the retina and may be spastic, thrombotic, or embolic in origin Occasionally only a branch of the central artery may be involved Such an occlusion is one of the really grave ocular emergencies, which must receive immediate attention if any therapy is to be effective The presenting symptom is always sudden visual loss, which may occur at any hour during the day or be noticed upon awakening Ophthalmoscopic examination reveals the striking picture of extremely diffuse, milky edema of the retina, with the macula standing out as a cherry red spot There is obliteration or extreme attenuation of the arterial blood tree, with either no blood flow or a small, slowly moving, segmented blood column in part of the vessels A proportionate but less striking loss of the venous blood column is also present Unless the blood flow in the central artery and its branches can be reestablished in a very short time by the vigorous use of vasodilators, sometimes supplemented by paracentesis to produce hypotension in the globe, optic atrophy will occur and blindness will be permanent in this eye even though the arterial blood flow may re-establish itself

Venous occlusions produce a somewhat less fulminating picture They are often gradual in onset and incomplete, and the visual loss (which is the patient's chief complaint) may be much less severe than that seen with arterial occlusions Ophthalmoscopic examination reveals marked distention and tortuosity of the involved vein (the central vein of the retina or one of its branches), hemorrhages along its course, and retinal edema and exudates If the central vein itself is occluded, papilledema may be present No other condition produces a more dramatic picture of retinal pathology than rapid occlusion of the central vein The entire fundus is filled with diffuse hemorrhages, yellow and white exudates, extreme edema, and papilledema

CHAPTER 11

Ear, Nose, and Throat

JAMES A HARRILL

While the aging patient may be troubled with any of the otolaryngologic conditions seen in younger individuals, most of his complaints related to the ear, nose, and throat are based on degenerative changes in the epithelium, subcutaneous tissues, blood vessels and neural elements This chapter will be limited to a discussion of the more common conditions encountered in this age group

THE MOUTH AND TONGUE

DRY MOUTH Dryness of the mouth may be due to nasal obstruction atrophy of the nasal turbinates, vitamin deficiencies, drug intoxication diabetes and local or generalized disease of the salivary glands It may represent a reaction to stress, emotional upsets, or physical stimuli It may also follow acute infectious diseases or irradiation Dryness related to massive irradiation usually lasts for months and is often resistant to treatment The lack of salivary secretions is rarely complete, but if complete (aptyalism) the condition is usually persistent

Before attempting to treat a patient with the complaint of *dry mouth* it is important to obtain a careful history, with emphasis on the patient s use of drugs Surgery should not be considered for this condition until other therapeutic measures have been given a thorough trial The patient should be instructed in oral hygiene Drugs that may be beneficial include potassium iodide, 5 to 10 drops of a saturated solution or 0 3 to 0 6 Gm (5 to 10 gr) of the enteric coated tablets three times a day, neostigmine bromide, 15

the vitreous, with many new vessels spreading out along these veins, may produce the characteristic picture of a proliferative retinopathy In its terminal form this retinopathy may lead to virtually complete destruction of the retina, and to retinal detachment with blindness When the stage of proliferative retinopathy is present, the patient has probably developed Kimmelstiel Wilson changes in his kidney.

The management of diabetic retinopathy, which is perhaps the most dreaded complication of diabetes, is still unsatisfactory The patient's diabetes should, of course, be well controlled Unfortunately, however, the retinopathy may progress despite apparently adequate treatment

Retinopathies in Diseases of the Blood Less frequent, but still important, are retinopathies accompanying blood dyscrasias Leukemia may be associated with engorgement and dilatation of the veins, exudates chiefly of the cotton-wool type, and hemorrhages that most characteristically contain a white patch in the center and resemble the hemorrhages seen in subacute bacterial endocarditis When stasis of the circulation becomes marked there may also be preretinal hemorrhages and edema

Pernicious anemia may cause, in addition to pallor of the fundus hemorrhages that may be either flame shaped or round, and may have white centers like those seen in leukemia The hemorrhages and occasional edema seen with anemia are due to slowing of the blood flow and to the lack of oxygenation and the increased bleeding tendency The ophthalmoscopic picture associated with polycythemia consists mainly of a purplish, cyanotic color of the entire fundus with venous dilatation and tortuosity

With purpura of all types, retinal hemorrhages and occasional preretinal hemorrhages may be seen, and in some cases cotton wool exudates are also found The treatment of these retinopathies is entirely dependent upon effective management of the responsible blood dyscrasia

up Vitamin B is helpful in a few cases The pain that follows a central vascular lesion seldom responds to treatment but usually becomes a minor complaint after three or four months Repeated assurance that oral cancer is not present gives relief to many patients

Leukoplakia For a discussion of leukoplakia see Chapter 9

Cancer Cancer of the oral cavity occurs far more frequently in men than in women the ratio being about 4 to 1 Leukoplakia and trauma are probably the most common etiologic agents

Squamous cell carcinoma is the most common malignant tumor found in the mouth It may appear as a small indurated ulcer or as a fungating friable bleeding mass The buccal mucosa and alveolar ridges are involved more frequently than the tongue and hard palate Adenocarcinoma is another tumor often found in the mouth probably because salivary tissues are distributed in abundance throughout the oral cavity Tumors arising from salivary tissue may infiltrate extensively and may even involve the regional lymph glands before ulceration of the epithelium occurs Sarcoma in this area usually arises from the adjacent bony structures or from the lymphoid elements in the back of the oral cavity

Biopsy is sometimes the only sure method for differentiating carcinoma from leukoplakia and nonmalignant ulcerative conditions involving the mucosa Finger palpation of the oral cavity and the tongue will often give valuable information Solitary flat ulcerative lesions present the greatest problem in differential diagnosis Removal of tissue for a biopsy rarely delays healing of a benign ulcer and may lead to the early diagnosis of a malignant lesion

Cancer of the mouth and tongue may be treated by irradiation or surgery or a combination of both Adenocarcinoma and melanosarcoma are resistant to irradiation as are carcinomas that have invaded cancellous bone Sarcomas are usually not resectable and respond better to irradiation therapy

Temporomandibular Joint Syndrome Congenital or acquired disturbances of occlusion often cause considerable discomfort Many older individuals suffer from malocclusion resulting from the removal of teeth The loss of molar support may cause pain in the region of the temporomandibular joint in the side of the face and even in the neck A burning sensation may develop within the

mg three times a day, and vitamins A (50,000 units daily) and B as in brewer's yeast tablets (3 to 6 daily) Local applications of light mineral oil may also be helpful

FISSURES Fissures of the lips are not uncommon in the elderly patient As the aging skin loses its elasticity, stretching often produces fissures of variable size and depth They usually occur in the corners of the mouth where the skin is moist, but may occur anywhere on the lips The chief symptom is pain, aggravated by placing the skin in a state of tension The loss of surface continuity may lead to an acute or chronic inflammatory process

These lesions are often slow to heal, partly because of continuation of the original trauma Biopsies should be performed on indurated areas that are suggestive of malignancy Therapeutic measures that may be helpful include bland ointments, local applications of silver nitrate, and administration of the vitamin B complex

GLOSSODYNIA Painful or burning sensations of the tongue may originate from lesions of local or adjacent structures, or may be central in origin The condition is often seen in women of middle age and beyond, and is usually associated with cancerphobia

Local lesions of the tongue that produce pain are ulcers, fissures acute and chronic inflammations, inflamed neoplasms, and herpes Syphilitic and tuberculous lesions are not painful unless secondarily infected Food allergy is responsible for some cases of glossodynia Symptoms referable to the tongue may be produced by disturbances of the temporomandibular joint (Costen's syndrome) resulting from malocclusion due to loss of teeth or ill fitting dentures, by dissimilar dental fillings, and by sensitivity to one or more chemicals used in the older types of dentures Troublesome glossodynia may follow cerebrovascular accidents

In 90 per cent of the cases, examination of the tongue and adjacent structures will reveal no gross abnormalities The local and general physical examination should be thorough Extra time should be spent in examining the mouth, tongue, pharynx, teeth and temporomandibular joints A routine blood count should be made

If nothing pertinent can be found, the patient should be assured that there is no evidence of cancer If malocclusion is present, the normal bite should be restored by dental prosthesis or local build

be employed Trauma to the nose should be avoided For the chronic form local applications of ammoniated mercury or antibiotic ointments are helpful The fissures after being cleansed, may be cauterized with a 10 to 50 per cent solution of silver nitrate When the condition persists, roentgen therapy may be necessary

CANCER OF THE EXTERNAL NOSE Malignant lesions involving the skin of the external nose are usually squamous or basal cell carcinomas The changes that occur in the skin as a result of age, trauma and exposure to the elements are probably the most important factors in their etiology Senile keratosis is often the forerunner of a basal or squamous cell carcinoma and for this reason it is essential that keratotic lesions be diagnosed early, treated promptly and observed periodically

Early carcinoma is often indistinguishable from senile keratosis The malignant lesion usually is thick and indurated, and is often characterized by increased vascularity Tissue for biopsy should be taken from all lesions that appear at all suggestive of malignancy Only as the lesion enlarges ulcerates, or infiltrates does the clinical diagnosis become obvious

Basal cell carcinomas are more common than the squamous cell variety The adenocystic basal cell carcinoma which probably arises from the skin appendages is seen less frequently

No hard and fast rules can be formulated for the management of these cases The type of tumor and the experience of the physician will determine the method of treatment employed It is the responsibility of the physician to see that treatment is adequate and to make the patient understand that he should stay under observation for years Small lesions may be removed by surgical excision irradiation or electrocauterization Larger lesions may require a combination of these methods, followed by skin grafts to correct surgical defects In most cases that are properly treated the tumor is completely eradicated and satisfactory cosmetic and functional results are obtained

Tumors of the external nose are associated with a low mortality rate Most of the deaths can be attributed to neglect on the part of the patient or to improper treatment by the physician, although some are caused by highly malignant tumors

EPISTAXIS Epistaxis occurs with increasing severity and frequency in individuals over the age of 50 The higher incidence in

throat or tongue Symptoms referable to the ear include stuffiness, pain, tinnitus, and deafness Trismus may be present

The diagnosis should be suspected when molar teeth are missing and when there is tenderness over the temporomandibular joints and over the mandibular nerve In acute cases following trauma external elastic splinting and local heat should be used In cases due to malocclusion, the restoration of proper occlusion usually removes the stress and in a large number of cases, though not in all, will give relief Favorable results have been reported from the injection of hydrocortisone into the temporomandibular joint Tremor of the masseter muscle has resisted treatment

THE NOSE AND SINUSES

VESTIBULITIS Dermatitis of the nasal vestibule may occur in either the acute or the chronic form, and is usually associated with staphylococcic infection The acute form usually follows some type of trauma Pulling out vibrissae or picking the nose sometimes causes acute infections of the hair follicles, which may lead to furunculosis and even to septicemia The chronic form of vestibulitis is usually associated with a long-standing nasal discharge It may involve the skin on the inner surface of the alae, and even on the upper lip The acute and chronic forms of this condition are often seen in diabetics and in patients with nasal allergies and infected sinuses

In the acute form of vestibulitis, the tip of the nose is often painful, red, and swollen A furuncle may form and come to a head within the nasal vestibule Chronic vestibulitis is characterized by the formation of fissures within the vestibule These are covered with dried crusts of mucus, which often cause the patient to acquire the habit of picking his nose

The presence of vestibulitis in either the acute or the chronic form should cause the physician to suspect diabetes, as well as allergy and suppurative diseases of the sinuses Appropriate measures for the diagnosis and, if necessary, the treatment of these conditions should be carried out

For the acute form of vestibulitis, dry or moist heat should be used locally If the patient's temperature becomes elevated, systemic treatment with antibiotic or chemotherapeutic agents should

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of 60 In elderly patients the symptoms are usually mild and are often associated with house dust Examination of the nose shows various degrees of bogginess, and occasionally a nasal polyp within the middle meatal area

[illegible]

all

desensitization may be indicated Obstructing polyps should be removed, unless this minor surgical procedure is contraindicated by the patient's general condition Operations on the sinuses should be avoided, if possible

Sinusitis After Sixty Sinusitis may develop at any age, although it is uncommon for a patient to have his first attack after the age of 60 The common primary causes of sinusitis, such as acute infectious diseases, allergy, nasal polyps, and bacterial sensitivities are seldom seen in the aged Secondary factors often responsible for the onset of the condition in elderly patients include carious teeth, fractures, carcinoma, sarcoma, and rarely tuberculosis or syphilis The physician should always be mindful of the possible relationship between sinusitis and cancer in this age group

The symptoms of acute sinusitis in this group, as in younger patients, are usually associated with those of acute rhinitis, but are more pronounced The mucoid discharge from one or both sides of the nose or from the nasopharynx becomes mucopurulent The patient may experience pain within the region of the involved sinus or sinuses, and tenderness may be present over the frontal or maxillary sinuses In maxillary disease, symptoms may be referred to the upper teeth The temperature may be slightly elevated, but is rarely higher than 101 to 102 F Higher temperatures or chills should make one suspect the onset of a complication Disturbance of the sense of smell is usual visual disturbances are rarely seen Often the only symptom presented by patients in the older age group is a unilateral purulent nasal discharge

The diagnosis of acute sinusitis is based on the patient's symptoms and on the external and intranasal examination, transillumination of the sinuses, and findings on nasopharyngoscopic and roentgen examination Tenderness may be present over the antrum, over the anterior wall or floor of the frontal sinus, or over the anterior medial wall of the orbit Pressure on one or more of the upper teeth may be uncomfortable Pressure on the supraorbital and infraorbital

this age group is explained by the pathologic changes occurring in the walls of the blood vessels

Epistaxis may be primary or secondary. The local causes are usually found in the anterior part of the nose The common site of bleeding is on the anterior portion of the nasal septum Erosion of the mucosa in Kiesselbach's area as a result of trauma, ulcers, septal perforations, sneezing, or violently blowing the nose is a common cause of bleeding The possibility of a benign or malignant tumor situated within the nose, sinuses, or nasopharynx must be considered The general or constitutional factors include hypertension, atrophic rhinitis, hereditary multiple telangiectasia leukemia, purpura, hemophilia, beginning infectious diseases, cardiac conditions, renal diseases, hepatic cirrhosis, tumors of the neck, and such physical changes as are produced by high altitudes

The physician's first concern in treating epistaxis is to find the source of the bleeding When the bleeding point is on the nasal septum, gentle pressure with a pledget of cotton saturated with hydrogen peroxide or epinephrine and left in place for 15 or 20 minutes will often stop minor bleeding After its removal the area should be cauterized with a silver nitrate stick or a chromic acid bead If this simple measure does not stop the bleeding or if the bleeding is so severe that adequate visualization cannot be obtained, the anterior portion of the nose should be packed with dry gauze When bleeding continues, it is often necessary to insert a posterior pack This should be removed within 48 hours if possible but removal may be delayed four or five days if necessary In some cases of severe bleeding ligation of the external carotid, internal maxillary, anterior ethmoidal, or sphenopalatine artery may be required

After the bleeding has been controlled, the physician should try to find the underlying cause of the epistaxis In some cases sedation and blood replacement may be indicated Two common pitfalls in the treatment of epistaxis are inadequate packing and inadequate sedation

Death rarely occurs from epistaxis alone It is important to remember, however, that patients who are accustomed to high blood pressure levels may be in shock when the blood pressure falls as low as 125 systolic, 80 diastolic

NASAL ALLERGY Nasal allergy rarely has its onset after the age

Among the etiologic factors that must be considered are local abnormalities within the nose that interfere with the normal physiology of this structure The dry air produced in most homes and offices by central heating impairs ciliary activity and increases the viscosity and accumulation of mucus It is very difficult to maintain in modern buildings an optimum humidity of 40 to 45 per cent Other factors to be considered are allergy, alcohol, tobacco smoke, emotional stress, metabolic and endocrine disturbances, prolonged local nasal medication, sinusitis, and malignant lesions The presence of a purulent or sanguineous discharge should make one suspect a malignancy of the nose, sinuses, or nasopharynx

In many cases it is extremely difficult to relieve a postnasal drip The nose and nasopharynx should be examined thoroughly It is important to consider the patient as a whole, and the history and examination should not be limited to the area of the chief complaint Allergies should be eliminated if possible The patient should be advised to use alcohol and tobacco only in moderation, and should be made aware of the problem of temperature changes and humidity variations In some cases surgical correction of mechanical abnormalities within the nose will be necessary

Cancer of the Nose and Sinuses Approximately 90 per cent of the malignant tumors arising within the nose or sinuses are carcinomas The remaining 10 per cent include sarcomas, lymphosarcomas, angiosarcomas, melanosarcomas, lymphoepitheliomas, cylindromas and neuroblastomas More than 60 per cent of all these tumors arise within the maxillary sinus

In the area of the nose and sinuses, as elsewhere, early diagnosis of malignant conditions is important Unfortunately the characteristic signs and symptoms of malignant tumors here—bleeding, pain obstruction, nasal discharge, and swelling—may also be produced by benign diseases Proptosis and nontender external swelling of the cheek or alveolar ridge are late signs of cancer In some cases the first sign of an intranasal tumor may be an enlarged gland in the neck

In cases of nasal obstruction, all questionable lesions should be examined pathologically If the pathologist's diagnosis is not consistent with the clinical impression, more representative tissue should be sent to him A blood tinged purulent discharge is extremely suggestive of cancer, as is the finding of a cloudy maxillary

nerves should be avoided Intranasal examination will determine, in most cases, whether the anterior or posterior group of sinuses is involved Diagnostic irrigations often yield helpful information It is especially important to obtain roentgenograms of the sinuses if the patient is having his first attack, or if the symptoms and findings are inconclusive

In the differential diagnosis, one must always consider a malignant lesion within the nose or sinuses The signs and symptoms of the two conditions are often the same, though cancer sometimes produces no symptoms except severe pain When cancer is present the nasal discharge may be blood-tinged and may have an odor External swelling, usually nontender, may be present, and a friable mass within the nasal cavity may be obvious on examination Tissue for biopsy should be removed from any lesion in the nose that might possibly be malignant Destruction of one or more of the sinus walls, disclosed by physical examination or by a roentgenogram of the sinuses, should make one suspicious of cancer, especially if the patient has pain

The general treatment of sinusitis should be directed toward improving ventilation, establishing drainage, making the patient more comfortable, and preventing complications and recurrences In most cases ventilation may be improved by the use of physiologic vasoconstrictor solutions in the nose, in the form of drops, sprays, or packs The shrinkage of the intranasal tissues enlarges the breathing space and favors drainage from the sinuses Analgesic drugs and physical measures that add to the comfort of the patient should be maintained throughout the course of the disease Antibiotics should be used when indicated As the acute edema within the sinus subsides, sinus irrigations may be helpful Surgical procedures within the nose are indicated only in recurrent and chronic cases or when signs and symptoms of an impending complication develop When corrective surgical measures are necessary, they should be as conservative as possible

Postnasal Drip Postnasal drip is a common complaint among adults It is a symptom rather than a disease, and the etiologic factors are numerous and varied Postnasal drip by itself is seldom indicative of any significant pathologic condition, and in most cases no evidence of increased nasal secretions can be found on examination

Among the etiologic factors that must be considered are local abnormalities within the nose that interfere with the normal physiology of this structure The dry air produced in most homes and offices by central heating impairs ciliary activity and increases the viscosity and accumulation of mucus It is very difficult to maintain in modern buildings an optimum humidity of 40 to 45 per cent Other factors to be considered are allergy, alcohol, tobacco smoke, emotional stress, metabolic and endocrine disturbances, prolonged local nasal medication, sinusitis, and malignant lesions The presence of a purulent or sanguineous discharge should make one suspect a malignancy of the nose, sinuses, or nasopharynx

In many cases it is extremely difficult to relieve a postnasal drip The nose and nasopharynx should be examined thoroughly It is important to consider the patient as a whole and the history and examination should not be limited to the area of the chief complaint Allergies should be eliminated if possible The patient should be advised to use alcohol and tobacco only in moderation, and should be made aware of the problem of temperature changes and humidity variations In some cases surgical correction of mechanical abnormalities within the nose will be necessary

CANCER OF THE NOSE AND SINUSES Approximately 90 per cent of the malignant tumors arising within the nose or sinuses are carcinomas The remaining 10 per cent include sarcomas, lymphosarcomas, angiosarcomas, melanosarcomas, lymphoepitheliomas, cylindromas and neuroblastomas More than 60 per cent of all these tumors arise within the maxillary sinus

In the area of the nose and sinuses, as elsewhere, early diagnosis of malignant conditions is important Unfortunately the characteristic signs and symptoms of malignant tumors here—bleeding, pain obstruction nasal discharge, and swelling—may also be produced by benign diseases Proptosis and nontender external swelling of the cheek or alveolar ridge are late signs of cancer In some cases the first sign of an intranasal tumor may be an enlarged gland in the neck

In cases of nasal obstruction, all questionable lesions should be examined pathologically If the pathologist's diagnosis is not consistent with the clinical impression, more representative tissue should be sent to him A blood tinged purulent discharge is extremely suggestive of cancer, as is the finding of a cloudy maxillary

sinus on transillumination or roentgen examination If cytologic examination of the antral washings is negative and no underlying etiologic factor is apparent, the antrum should be opened and directly inspected

Roentgen examination of the sinuses plays an important part in making the diagnosis of cancer, determining the extent of involvement, and selecting methods of treatment Destruction of the walls of the sinus, as demonstrated on the regular sinus views or by tomographic study, usually means malignancy Pain takes on added significance in the presence of bony destruction

Most malignant tumors of the nose and sinuses are treated by a combination of surgery and roentgen therapy Surgery followed by the implantation of radioactive cobalt and supplementary external irradiation may prove to be the treatment of choice

THE LARYNX

Hoarseness is a common complaint in all age groups In an elderly patient it must be distinguished from physiologic changes in the voice that occur with the aging process The voice is often altered by muscular atrophy, thinning of the vocal cords, loss of muscular co ordination, and atrophic changes in the resonant cavities and structures

Hoarseness indicates changes that have interfered with one or several of the necessary laryngeal functions Any lesion that alters the tension, approximation, or vibration of a vocal cord will produce hoarseness Hoarseness is often an early symptom of cancer

KERATOSIS Hyperplasia with keratinization of the epithelium of the larynx is fairly common in elderly patients Its etiology is not known, though it is generally agreed that long continued laryngeal irritation is a predisposing cause Except in cases that undergo malignant change, the basement membrane remains intact

Huskiness or hoarseness is usually the only symptom Occasionally the patient will complain of a feeling that there is "something in the throat," or of an irritating cough

The treatment consists in removing factors that might cause chronic irritation Stripping of the vocal cord may be necessary Frequent biopsies should be made on potentially malignant areas,

and the patient should be closely observed for any suspicious changes

MALIGNANT NEOPLASMS With the exception of postcricoid carcinoma, malignant growths involving the larynx are seven times more common in men than in women Ninety per cent of the cases are squamous cell carcinomas

The early symptoms depend upon the location of the tumor For practical purposes, the larynx may be divided into the intrinsic and extrinsic portions The intrinsic portion includes the true vocal cord, the ventricle, and the undersurface of the false cords The upper surface of the false cords, the aryepiglottic folds, arytenoids, epiglottis, pyriform sinuses, and postcricoid and subglottic areas comprise the extrinsic portion of the larynx Since most cancers of the larynx arise on the anterior half of the free surface of the true vocal cord, the most common and often the only early symptom of intrinsic cancer is hoarseness Cough or wheezing may be either a late or an early symptom Pain, dyspnea, dysphagia, enlarged cervical glands, and loss of weight are late symptoms

The earliest symptom produced by cancer of the extrinsic portion of the larynx may be nothing more than an uncomfortable feeling in the throat As the tumor grows, the patient may have difficulty in swallowing, hoarseness, pain in the laryngeal region or the ear, blood tinged sputum, enlarged cervical glands, or dyspnea

Constant awareness that hoarseness or an uncomfortable feeling in the throat *may mean* cancer is the important first step in making the diagnosis of laryngeal malignancy An indirect examination of the larynx will usually reveal the cause of the hoarseness If this view is not adequate, a direct examination should be made All questionable lesions should be examined by biopsy The trachea and esophagus should be examined if the cause of the hoarseness is not obvious Roentgen studies of the neck and chest are often helpful The same diagnostic procedures should be followed when patients complain persistently of an uncomfortable feeling in the throat, even without hoarseness If all findings are negative, these patients should be kept under observation, but given all justified reassurance

Cancer of the larynx should be treated by surgery, roentgen therapy, or a combination of the two methods. The location of the

lesion rather than the grade of malignancy is the factor to be considered in selecting the method of treatment Early lesions limited to the vocal cord may be ideally treated by either surgery or irradiation For more extensive lesions when no cervical glands are palpable, the treatment of choice is laryngectomy with elective prophylactic block dissection of the neck In cases with demonstrable enlargement of the cervical glands, a combination of surgery and irradiation is indicated

THE EAR

Cancer of the External Ear The skin covering the external ear is subject to the same premalignant and malignant conditions that involve the skin elsewhere, and especially the skin of the face The basal cell carcinoma is the most common malignancy of the skin The same etiologic factors responsible for the development of this lesion on the nose and face apply to the ear Two thirds of the cases of basal cell carcinoma of the ear occur after the age of 60, and the tumor is three times more common in men than in women

Malignant tumors of the external ear, like those involving the external nose, cannot be treated by hard and fast rules In both cases adequacy of treatment should take priority over cosmetic results

Tumors that arise within the external auditory canal, especially squamous cell carcinomas, are difficult to manage If such a carcinoma reaches the middle ear space, cure is rarely obtained

External Otitis and Otitis Media Acute inflammatory diseases of the external and middle ear are more common in youth than in old age The underlying factors usually responsible for the production of external otitis—swimming purulent discharge from acute or chronic otitis media, skin allergies, and sensitivity to the staphylococcus—are more commonly associated with younger individuals Less common etiologic factors that might predispose older individuals to disease of the external ear canal include thinning of the epidermis a decrease in apocrine activity, and diabetes Since temperature and humidity (as well as trauma) are important factors in the production of external otitis, the incidence of this condition will vary markedly according to local climatic conditions

The treatment of external otitis is directed to reducing the inflammatory process eliminating the contributing factors and relieving the patient's discomfort Skin tests may be necessary in some cases of external otitis that are due to contact dermatitis Diabetes should be considered as a possible etiologic factor

In cases of acute diffuse external otitis the local application of hot wet boric acid dressings in combination with analgesics by mouth is usually sufficient Antibiotics are rarely necessary Impacted cerumen and exfoliated epithelium should be removed as soon as this can be done without maceration of the skin The local application of hydrocortisone alone or combined with antibiotics produces dramatic cures in some cases of dermatitis It is especially effective in relieving the itching produced by neurodermatitis of the external ear When external otitis is due to a chronic bacterial infection the ears should be washed out with *alcoholic solutions* containing antibiotics The antibiotic agents should be discontinued after the bacterial infection subsides and the patient should be carefully observed for any evidence of sensitivity to the drug used The indiscriminate use of antibiotics may permit *uncontrolled* growth of fungi Other useful drugs for local application in cases of external otitis are a 2 per cent solution of salicylic acid in alcohol Cresatin a 1 per cent solution of thymol in 50 per cent alcohol and a saturated solution of boric acid in alcohol

Like external otitis *acute* otitis media is *not often seen in* older individuals Its management in this age group however is the same as in younger patients Nasal ventilation and adequate doses of an antibiotic should be instituted early Myringotomy may occasionally be necessary

The incidence of *chronic* otitis *media* in older individuals is greater th... these patients have had chronical... If acute *otitis* media is adequate... become *chronic*

The treatment of chronic otitis media varies with the individual case Ears presenting central perforations often respond to conservative management. These include local cleansing antibiotic ear drops containing boric acid and alcohol and the management

... complications or mar... perforations with cholesteatoma and in some cases

where conservative management fails, mastoid surgery may be required When possible, conservative operative procedures designed to retain good functional hearing should be employed In some cases, however, a complete radical procedure is advisable

SEROUS OTITIS The formation of nonpurulent fluid within the middle ear is termed serous otitis While the condition is most often seen in children, no age group is immune Its etiology is often obscure It is often associated with acute or chronic allergic states with virus infections, acute inflammations of the middle ear, sudden changes in air pressure, blockage of the eustachian tube, or disturbance of the tubal lymphatics In the adult we should always be mindful of the latter two possibilities, especially if the patient is over 50 The condition seems to be on the increase since the advent of the sulfonamide and antibiotic drugs

Patients with serous otitis complain of a stuffy ear and some loss of hearing When the middle ear is filled with fluid, it is often difficult to recognize the condition When both fluid and air are present in the middle ear, otoscopic examination may reveal bubbles, a fluid line, or both The drum may be coppery in color or the only abnormality observed may be that the handle of the malleus appears as a chalky line A diagnostic myringotomy or aspiration is sometimes warranted

All patients with this condition should have a thorough examination of the nasopharynx In the older age group, cancer of the nasopharynx is a common etiologic factor

Serous otitis often resolves spontaneously Tubal inflations and the local use of agents to shrink the nasal membranes are helpful Myringotomy or needle puncture of the drum may be necessary In chronic cases a small polyethylene tube is sometimes inserted through the myringotomy incision Obstruction resulting from nasopharyngeal tumor is usually relieved by adequate irradiation

DISORDERS OF THE INNER EAR *Tinnitus*, or ringing in the ear, is a common and disturbing symptom in elderly patients True tinnitus has its origin in the peripheral or central auditory system and is nonvibratory in character It must be distinguished from vibratory tinnitus, which may originate from the adjacent vessels muscles, or joints Although most otologic diseases may be accompanied by tinnitus, the pathologic conditions responsible for tinnitus in elderly patients are usually located in the inner ear or

in the central auditory pathways and are secondary to degenerative changes within the neural and vascular elements of this system

In most cases the only treatment that can be offered is reassurance and mild sedation Sedatives are especially helpful in those patients who have difficulty in sleeping A pillow microphone attached to the bedside radio is often helpful In extreme cases psychiatric consultation may be advisable

Vertigo or dizziness is probably the most common complaint offered by patients over 65 who consult an otolaryngologist Attacks of vertigo varying in severity and duration are experienced at some time by 90 per cent of individuals over 65 In a great many of these patients the vertigo is postural in character

Disturbances that produce vertigo may arise within the labyrinth or its central pathways from conditions affecting the muscle and joint senses or from the

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pa p of a full feeling in one ear As the disease *progresses* the vertigo is associated with tinnitus and with fluctuations in auditory acuity After repeated attacks the hearing loss becomes more pronounced

Vertigo of either central or peripheral origin is characterized by a sensation that the subject s environment *is rotating and* is usually associated with ataxia nystagmus and nausea The nystagmus when present is in a constant direction

Ocular vertigo may be secondary to refractive error to muscle imbalance or to diseases of the retina or central nervous system The patient has a sensation of giddiness or unsteadiness but not that of rotation Nystagmus may or may not be present when present it is usually *rhythmic in* character Symptoms related to the ear are absent

Conditions that *interfere* with the afferent impulses from the muscles and joints such as tabes dorsalis and anesthesia or paresthesia of the soles of the feet may lead to inco-ordination In the light ocular impulses can correct the false sensations but in the dark the patient experiences considerable difficulty in equilibration He usually describes this unsteadiness as *dizziness*

Circulatory disturbances also may produce dizziness The syncope associated with alterations in the blood pressure, and with anemias, vasomotor instability, hypothyroidism, Addison's disease, the Stokes-Adams and carotid syndromes, and cachectic states may be confused with vertigo

The type of vertigo most frequently seen in elderly patients is not associated with auditory disturbances, and seldom with demonstrable signs of central nervous system disease The vertigo is usually postural, and some degree of nystagmus may be present The lack of significant findings in the auditory and central nervous systems makes it difficult, in the majority of cases, to localize the disease process Positional nystagmus is suggestive of a central origin, but it is probable that many patients may have end plate involvement within the labyrinth

Other conditions that produce vertigo are upper respiratory and gastrointestinal infections, drug intoxication or sensitivity, inflammatory, degenerative, traumatic, and expanding lesions of the central nervous system, infections or irritation of the peripheral vestibular system, organic changes in the peripheral and central blood vessels, and alterations in blood sugar levels

Vertigo of psychic origin is not rotational and is not associated with nystagmus or ataxia These patients have difficulty in describing their symptoms

The treatment of vertigo presents many problems A complete examination may give some indication as to its possible etiology, but in the majority of elderly patients, unfortunately, the diagnostic studies will not disclose the location of the responsible pathologic condition

Diseases of the external and middle ear that give rise to vertigo usually respond to appropriate treatment The medical therapy for Meniere's disease includes the following measures restriction of fluids, a sodium-free diet with the addition of ammonium chloride, intravenous or subcutaneous histamine, intravenous procaine, thiamine and nicotinic acid, antihistaminic drugs, and a combination of antihistaminic and anticholinergic drugs with vasodilators Patients who are incapacitated by Meniere's disease and do not respond to medical treatment may require electrocoagulation of the labyrinth or resection of the eighth nerve

If the physical examination reveals any local or systemic condi

tion that may produce vertigo appropriate corrective measures should be instituted In most other cases the only treatment is re assurance together with small doses of sodium phenobarbital

Presbycusis or senile deafness results from the inevitable irre versible changes that occur within the aging cochlea These changes are often superimposed on a previously damaged ear that was giving serviceable hearing

Observations of the aging cochlea in human beings and in animals have revealed epithelial and neural atrophy beginning in middle life and progressing slowly for years Degenerative changes may also result from vascular or toxic conditions or from acoustic trauma These changes decrease the elderly patient s ability to discriminate sounds and to hear high tones

Because of the decreased ability to discriminate sounds many patients cannot be helped bv a hearing aid since increased volume does not increase the intelligibility of words These problems should [illegible]

[illegible] encouragement and reassurance

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gallbladder, and the appendix It was often routine procedure in cases of arthritis to remove the tonsils and teeth, to drain the sinuses and to massage or enucleate the prostate

The theory of focal infection was challenged by a few brave souls who considered the nature of arthritis to be more closely akin to a metabolic disturbance in suspectible individuals Over the years each group gradually gave up unproved or disproved ideas, and finally met on common ground It is now generally accepted that while infections may possibly initiate or aggravate arthritis, individual susceptibility plays a major role (Favour *et al*, 1956)

Though the exciting cause of rheumatoid arthritis is not yet known, certain predisposing factors are generally recognized Among these are fatigue, faulty posture, exposure to cold, trauma, emotional stress and repeated upper respiratory infections Attempts to incriminate the diet have not been successful

The clinical picture of rheumatoid arthritis is very much the same in patients of all ages The smaller joints—wrists, elbows, and ankles—are more apt to be involved than the larger The synovial membrane is inflamed, so that motion of the joint is painful Almost always a number of joints are involved The inflammation may migrate from one joint to another, but is much more apt to persist in the same joints than is the case with rheumatic fever The patient usually sleeps restlessly, and is often awakened by pain unless he has enough analgesic medication Remissions and exacerbations of no predictable length may be expected

Diagnosis The diagnosis is made by the history, physical examination laboratory findings, and possibly by x ray studies The history is one of pain, usually involving many joints, aggravated by motion and often associated with fatigability

In the acute stage the physical examination shows swollen, warm, red, tender joints, especially in the hands There may be some fever and the pulse rate is nearly always increased Later the joints may be knobby and deformed, the fingers being deviated to the ulnar side Often the joints become ankylosed

The erythrocyte sedimentation rate is increased in 95 per cent of the cases although the leukocyte count is generally normal Hypochromic or normochromic anemia is usually present The serum uric acid is not often elevated

Roentgenograms show osteoporosis in the surrounding bone, and

CHAPTER 12

The Musculoskeletal System

WINGATE M. JOHNSON

BONES AND JOINTS

Although nonmedical people look upon "rheumatism" as a common affliction of old age, acute rheumatic fever is a disease of the young, and is too rare after middle life to warrant a discussion in this book. Arthritis is a more accurate term for the miseries in the joints suffered by old people. The three important forms of arthritis are: (1) rheumatoid, infectious, or atrophic arthritis; (2) degenerative, hypertrophic, or osteoarthritis; and (3) gouty arthritis. Gout is discussed in the chapter on metabolic disorders. Rheumatoid spondylitis occurs too infrequently in the older age group to warrant discussion here.

The Arthritides

Rheumatoid Arthritis (Infectious or Atrophic Arthritis)

While most cases of rheumatoid arthritis begin before 40, 10 per cent of its victims are over 60 when they have their first attack. And because it has such a protracted course, 20 to 25 per cent of all patients with this type of arthritis are 60 or older (Boland, 1958).

Although the disease is sometimes called infectious arthritis, its bacterial origin has not yet been proved. A generation ago the consensus was that it was always infectious in origin, and could be relieved by removing the "focus of infection." The foci most under suspicion were the tonsils, the teeth, the sinuses, the prostate, the

a short time by a light plaster or aluminum splint that will hold the fingers straight

Heat in the form of an electric pad an infrared lamp hot moist compresses or paraffin baths should be applied to the affected joints two to four times daily for 20 to 30 minutes or the whole body may be immersed in a tub of warm water (102 F) for periods not exceeding 20 minutes An electric blanket is to be recommended as a means of keeping the body warm at night without the discomfort of heavy bed covers and it may be turned on for hourly intervals two or three times a day The patient should be warned against becoming chilled The ambulant patient should wear gloves and warm stockings when he goes outdoors He should also avoid becoming unduly fatigued

Even during the acute stage the joints should be given gentle passive exercise Later as the pain subsides they should be moved actively in order to avoid ankylosis A physiotherapist a doctor, or an experienced nurse should instruct the patient in suitable exercises and should supervise him until he understands how to take them Exercises suitable for arthritic patients are described in the "Home Care" booklet already mentioned

Many drugs have been employed in the treatment of atrophic arthritis but the salicylates have best stood the test of time Of many forms available acetylsalicylic acid or aspirin is the most effective pain reliever and is tolerated as well as any salicylate For most patients 0 65 to 1 3 Gm (10 to 20 gr) of aspirin or sodium salicylate four times a day will give relief It is best for the patient to take the doses after meals and with a glass of milk at bedtime Given on an empty stomach aspirin may produce gastric irritation and even bleeding The far more expensive buffered tablets of aspirin are widely advertised but controlled tests have shown that they have no advantage over plain aspirin (Batterman 1958) Enteric-coated tablets of aspirin or of sodium salicylate 0 65 to 1 3 Gm (10 to 20 gr) may be used if the plain tablets cause irritation though it is possible that they are not as well absorbed

Because of the dramatic relief from pain provided by the various forms of cortisone or by corticotropin and because every patient knows of these "wonder drugs" the doctor is often strongly tempted to resort to them This form of therapy however should be reserved for the most severe cases of arthritis if indeed it is ever

narrowing of the interspaces In advanced cases ankylosis and subluxation of the joints may be observed

TREATMENT Ideally, the treatment of a patient with acute rheumatoid arthritis should be begun in a hospital where a trained physiotherapist can instruct the patient and his family in the proper type of exercises to take If instruction by a physiotherapist is not feasible, the physician must take the responsibility for teaching the patient how to care for himself Arthritis is somewhat analogous to diabetes, in that the more the patient knows about his disease the better he can cope with it An excellent little booklet for the physician to read and to give his arthritic patients is 'Home Care in Rheumatoid Arthritis' (Copies may be obtained from The Arthritis and Rheumatism Foundation, 10 Columbus Circle, New York 19 N Y) The doctor who treats many arthritic patients—and what general practitioner or internist does not?—would be wise to keep a supply of these booklets on hand to give his patients

The objectives of treatment are to prevent crippling and deformity, to enable the patient to resume a reasonable amount of activity, and to stimulate his determination to become or remain useful The treatment, which is virtually the same for older patients as for younger ones, consists of four components (1) rest (during the acute stage), (2) heat to the inflamed joints, (3) graduated exercise, and (4) some form of drug therapy The diet should be well balanced and suited to the needs of the individual If he is thin and poorly nourished, a high protein, high calorie diet is needed If he is overweight, a reduction diet is in order

If many joints are affected, the whole body should be put at rest by keeping the patient in bed for a short time Prolonged or complete bed rest, however, is seldom indicated and may actually retard or prevent recovery Even if motion is painful, the patient should be encouraged to turn over (or should be turned) frequently, should use a commode or toilet rather than a bedpan, and should sit up for meals and feed himself if possible He should be taught to keep the joints as straight as possible while in bed, and to resist the tendency to lie with them flexed Plywood bed boards under a firm mattress are recommended Since the weight of the cover tends to turn the feet outward, a board 3 or 4 inches wide should be placed on edge across the foot of the bed to keep the covers off the feet In some cases the hands may be immobilized for

a short time by a light plaster or aluminum splint that will hold the fingers straight

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tively small 0.125 to 0.250 Gm daily Thus far only a very few serious side effects have been noted but it may occasionally depress the bone marrow or cause liver damage

The spontaneous remissions and exacerbations that characterize rheumatoid arthritis make evaluation of any remedy difficult Some observers have spoken of "the inevitable 70 per cent improvement" that may be expected to occur when any new remedy for arthritis is tried by a physician who is enthusiastic about its possibilities

Of supreme importance in treating arthritis is an optimistic attitude on the part of the physician He must not accept even though he can understand Osler's advice to a young doctor who asked him what to do for arthritis to climb the back fence when a patient with arthritis comes in the front door Most arthritic patients are almost pathetically grateful for any help It has been said that even 50 per cent improvement is heaven for many patients with arthritis They have learned not to expect miracles but they do at least deserve tender loving care

Osteoarthritis (Degenerative or Hypertrophic Arthritis)

Degenerative arthritis is found in virtually every person past 60 and in many much younger It is largely a result of prolonged wear and tear on the joints of the skeletal system It rarely cripples the victim The principal etiologic factors in degenerative arthritis are obesity faulty posture trauma and possibly impaired circulation (arteriosclerosis)

The cartilage is the part of the joint chiefly affected It is worn thin and may be roughened by constant wear The joint edges may protrude in the form of spurs" The large weight bearing joints are naturally most apt to be involved especially those of the lower spine knees ankles shoulders and neck A notable exception is the familiar Heberden's nodes of the fingers which are for some reason far more common in women than in men

DIAGNOSIS The chief manifestations of degenerative arthritis are stiffness on arising dull aching rather than pain and slight limitation of motion The stiffness and soreness are most noticeable after the patient has been lying or sitting still for a time and usually wear off with moderate exercise Too prolonged exercise however may cause a return of the soreness

When arthritic spurs cause pressure on dorsal nerve roots of the

justified. Among its unhappy possible consequences are salt retention with edema; the activation of latent infections or of peptic ulcer; "moon face"; demineralization of the bones with the consequent danger of compression fracture; mental changes; and increased blood pressure. By no means the least objection to the use of cortisone and corticotropin is their great expense as compared with aspirin.

A study of the comparative effectiveness of aspirin and cortisone in the long-term management of atrophic arthritis has been carried on in Great Britain since 1951. The results of this study, published in the *British Medical Journal* (1957), showed that in most cases, over a long period of time, aspirin proved to be more satisfactory than cortisone.

Since cortisone was introduced, its original chemical structure has been changed many times by drug manufacturers. The modifications have eliminated many of the disadvantages of the original preparation, and it is probable that even further improvements will be made. At this writing the most satisfactory substitutes for cortisone are prednisone (Meticorten, Deltra, Deltasone) and prednisolone (Delta-Cortef, Hydeltra, Meticortelone, Meti-Derm), triamcinolone (Aristocort, Kenacort), and methylprednisolone (Medrol). It is possible that these newer steroid preparations may modify the conclusion reached by the British research team, and that combined therapy with smaller doses of both steroid and salicylates may become more popular.

The intracapsular injection of hydrocortisone (25 to 50 mg. in 1 cc. of saline solution) or one of its modifications may give striking relief without the dangers associated with the systemic administration of the cortisone derivatives. The injection may be repeated at intervals of three to ten days, as indicated.

Gold salts were first used for rheumatoid arthritis in 1924. At that time they were tried for their bactericidal action, when it was generally believed that the disease was caused by infection. Although striking improvement may follow gold therapy in some cases, gold salts so often cause liver damage and other untoward effects that their use is seldom justified (Favour, *et al.*, 1956).

Recently a number of observers have reported that an antimalarial drug, chloroquine (Aralen Phosphate), has shown promise as a remedy for arthritis. The dosage recommended is compara-

If the patient is overweight, he should be strongly advised to get rid of the excess burden he is carrying This advice should be reinforced by a reduction diet and by follow up supervision The importance of weight reduction should also be discussed with some responsible member of the family

A firm mattress and plywood bed boards should be prescribed The patient should be told that good posture and a reasonable amount of exercise will alleviate stiffness and soreness The circulation to the affected joints and muscles can be improved by heat

If the pain is too severe to be ignored, salicylates, especially aspirin may be prescribed for relief Another time honored remedy that may afford considerable relief is iodine in the form of enteric-coated tablets of potassium iodide, 0 325 to 0 65 Gm (5 to 10 gr) three or four times a day For the stiff neck that may result from arthritis of the cervical spine nicotinic acid, 50 to 100 mg three times a day 20 to 30 minutes before meals, is often as effective as diathermy The use of steroids should be avoided in all cases

MALUM COXAE SENILIS Advanced osteoarthritis of the hip is designated as *malum* (or *morbus*) *coxae senilis* It is characterized by marked thinning of the articular cartilage, with spurring and encroachment on the joint space Trauma probably plays a part in this condition which usually affects one hip to a much greater extent than the other The patient walks with a limp, putting more weight on the less affected side Often crepitation may be felt

Short of surgery the only therapeutic measure that may give relief is weight reduction for the obese patient If walking is too painful a crutch or cane may be used to take the weight off the joint The most severe cases may require arthrodesis, which leaves a stiff joint or arthroplasty with a Vitallium cup

Mixed Arthritis

While the term "mixed arthritis" is used perhaps too loosely, it is possible for the rheumatoid type of inflammation to attack the synovial membrane of a joint already affected with degenerative arthritis In such cases one would expect to find increased pain, swelling and heat in the joint an elevated sedimentation rate, and possibly slight fever The treatment would be that of uncomplicated rheumatoid arthritis

spine, pain may be felt along the course of the nerves involved The nerve roots most often affected are those in the lumbar or lumbosacral area of the back, followed in frequency by the cervical nerves and then those in the mid-thoracic area. The pain may be very severe after some unusual movement that results in undue pressure or traction on the nerve root.

Pressure on nerve roots in the lumbar region most often produces pain referred along the course of the sciatic nerve Pain from nerve roots in the cervical spine may be referred down the arm along the course of the brachial plexus, or into the neck When nerve roots in the lower cervical and upper thoracic spine are involved, pain may be referred to the chest wall and at times may simulate angina pectoris. Pain from nerves arising in the middle or lower thoracic region may be referred to the abdominal wall, at times suggesting biliary or renal colic

The diagnosis of degenerative arthritis is comparatively easy. The condition should be suspected when a patient beyond middle age gives a history of stiffness or soreness after rest, relieved to some extent by exercise and involving chiefly the larger joints The presence of Heberden's nodes gives confirmatory evidence of osteoarthritis Frequently some crepitation can be felt on moving the joint The absence of anemia or an elevated sedimentation rate helps to distinguish the condition from rheumatoid arthritis (Table 12-1) Roentgenograms of the spine or joints will reveal the characteristic osteophytic spurs

TABLE 12-1 THE DIFFERENTIAL DIAGNOSIS OF RHEUMATOID AND DEGENERATIVE ARTHRITIS

	Age of onset	*Joints involved*	*Pain*	*Deformity*	*Sedimentation rate*	*Anemia*
Rheumatoid arthritis	Usually under 40	Smaller exposed joints	Severe increased by exercise	May be severe	Increased	Present
Degenerative arthritis	Usually above 50	Larger weight bearing joints	Slight relieved by exercise	None or slight	Normal	None or slight

TREATMENT A most important part of the treatment is explaining to the patient the comparatively benign nature of degenerative arthritis. Usually one may reassure him that he will not be crippled, that the condition will not get worse, and that it is compatible with a normal life span and with normal activity.

a narrowed intervertebral space and a myelogram may confirm the diagnosis by outlining the protruding nucleus

TREATMENT The treatment depends a great deal upon the severity of symptoms In some cases the pain is not severe enough to be disabling and may be relieved by a firm support a sacroiliac belt, or even a canvas belt two or three inches wide buckled tightly around the hips just under the iliac crest More severe pain may require a few days or even a few weeks in bed with a bed board under the mattress and possibly an electric pad to the back Traction is often used but its efficacy is doubtful Lying on the face with one or two pillows under the lower part of the abdomen will usually give temporary relief and help restore the nucleus to its normal position

The more stubborn and severe cases may require operation for removal of the nucleus The operation may be done either by a neurosurgeon or by an orthopedist The choice will often depend upon the custom in the community As a rather arbitrary rule three months of moderately severe pain is enough for the patient to endure before operation In more severe cases the patient is likely to demand surgical relief after a much shorter time

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tre

[illegible] Opiates are rarely indicated and should be avoided except for brief periods of time If the pain cannot be controlled by rest and the combinations of aspirin and acetophenetidin (Phenacetin) possibly with a little phenobarbital and codeine added operation should be considered

Cervical Disc

Herniations of a lumbar disc are much more frequent than those of a cervical disc According to Spurling (1956) protrusions of a cervical disc occur between the sixth and seventh cervical vertebrae in 70 per cent of the cases between the fifth and sixth in 24 per cent Thus in 94 per cent of the cases it is the sixth or seventh cervical nerve root which is compressed.

Protrusion of a cervical disc produces pain that is felt medial to the scapula sometimes over the pectoral region and down the arm to the forearm occasionally to the hand and the fingers It is aggravated by coughing sneezing or straining The neck is usually held

Intervertebral Disc Syndrome

Lumbar Disc

A fairly common affliction of adults in all age groups is the low backache caused by backward displacement of an intervertebral disc. This is apt to follow unusual strain on the lower spine. Stooping forward instead of squatting to lift a heavy weight, a sudden awkward movement, or a slip or twist may force the intervertebral disc backward. The resultant pressure of the nucleus against the posterior ligament causes pain that is generally felt in the mid-line or the superior mid-gluteal region. Muscle spasm adds to the discomfort.

In the more severe forms a tear in the annulus allows the nucleus to become herniated, with resultant pressure on the dorsal nerve root. When this occurs, the nucleus may become swollen and edematous, and the pain really agonizing. It usually radiates down one leg, along the course of the sciatic nerve, and has been aptly described as "toothache from hip to heel." As a rule, the pain is most severe in the gluteal region, the calf of the leg, and the outer side of the foot. It is aggravated by stooping over, coughing, sneezing, or straining at stool. In most cases, the patient has had a number of apparently minor episodes of low backache before the annulus tears and herniation occurs.

In 95 per cent of the cases involving the lower spine, the herniation occurs between the fourth and fifth lumbar vertebrae, or between the fifth lumbar vertebra and the sacrum. These two locations are involved with about equal frequency, and occasionally both interspaces may be affected. When the herniation occurs between the fourth and fifth lumbar vertebrae, it is apt to cause numbness along the outer side of the thigh and leg and the anterior surface of the foot. Herniation between the fifth lumbar vertebra and the sacrum usually produces numbness along the back of the leg and the outer side of the foot.

In most cases the patient leans away from the affected side. Straight leg raising is very painful. Both the ankle and the knee jerk—particularly the ankle jerk—may be diminished or lost.

A diagnosis can usually be made on the basis of the history and the physical examination. A roentgenogram of the spine often shows

bursa It is characterized by tenderness over the subacromial bursa and pain on abduction or external rotation of the arm A useful diagnostic question is "Does it hurt you to comb your hair? The roentgenogram will frequently show calcium deposits in the tendon

Bursitis may be acute or chronic In the acute form actual swelling may be seen over the bursa and the pain may be really agonizing Cecil says that the calcium deposit forms a sort of cyst which

be up and around In the very severe form however, bed rest with a small pillow under the elbow may be needed. Heat gives relief in some cases but in others may increase the pain in such cases an ice bag may be more soothing At the height of the pain morphine methadone meperidine (Demerol) or Dilaudid may be needed for a short time Roentgen therapy often shortens the duration of the acute attack although it is not effective in chronic bursitis

In the chronic form judicious exercise of the shoulder and arm is important Shrugging the shoulders a few times or performing the shoulder exercises described in the booklet Home Care in Rheumatoid Arthritis will help prevent stiffness and possibly a frozen shoulder

The prognosis for ultimate recovery in either form is good Chronic bursitis may last *for months* yet finally disappear

The Shoulder Hand Syndrome The shoulder hand syndrome or reflex muscular dystroph

in the shoulder

followed by Du The elbow almost always escapes (Steinbrocker *et al* 1948)

Roentgen therapy is helpful in the early stage but not after the condition has existed for several months Stellate block may be helpful Cortisone or one of its modifications given orally may afford relief but should not be used for long periods The patient should be encouraged to exercise the shoulder and the hand gradually increasing the exercise periods and the range of motion Squeezing a rubber ball in the affected hand helps to prevent contracture

Arthritis Arthritis has already been discussed under a separate heading

Adhesive Peritendinitis Adhesive peritendinitis ("frozen

away from the affected side Pressure on the nerve root may cause numbness in the hand from the first to the third digit if the seventh root is compressed, and in the back of the thumb if the sixth is involved Roentgenograms show loss of the cervical curve and a narrowed interspace

TREATMENT Much relief is obtained by traction on the head using a sling under the chin and a weight of between 5 and 10 pounds suspended by a rope over a pulley (Fig 12 1) The traction apparatus may be used several times a day for an hour or more at a time, and may be supplemented by a collar brace to be worn when

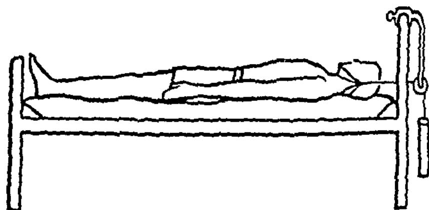


FIG 12 1 Traction apparatus for use in the conservative management of a herniated cervical disc (from Home Care in Rheumatoid Arthritis)

the patient is up and around If conservative treatment fails surgery is needed to relieve the pressure on the nerve

The Painful Shoulder

In the older person the shoulder joint is especially vulnerable to painful conditions Cecil (1955) divides the cases of painful shoulder into four groups

1 Calcific tendinitis (subacromial bursitis)
2 Shoulder hand syndrome (reflex muscular dystrophy)
3 Arthritis
4 Adhesive peritendinitis (frozen shoulder)

CALCIFIC TENDINITIS Calcific tendinitis or bursitis is a painful affection caused by calcium deposits in the tendons of the supraspinatus or infraspinatus muscles on the floor of the subacromial

gestive heart failure There is no known treatment of the primary disease, although the complications must receive appropriate therapy

Hyperostosis Frontalis Interna (Metabolic Craniopathy, Morgagni-Stewart-Morel Syndrome)

Hyperostosis frontalis interna, a condition in which a deposit of dense bone occurs on the inner surface of the frontal bone, is most often found after the fifth decade (Dann, 1951, Bauer and Bartter, 1935 Reifenstein 1958 Moore, 1955) It was present in 42 of 4 200 consecutive patients admitted to the North Carolina Baptist Hospital (Grollman and Rousseau, 1944) Only one of these patients was a man and 97 to 98 per cent of the reported cases have been in women

The most frequent findings in patients with *hyperostosis frontalis interna* are obesity, headache dizziness, hypertension, and multiple neurotic symptoms Many women give a history of having had irregular menstruation or amenorrhea The most characteristic part of the picture however is the multiplicity of psychoneurotic complaints which [illegible] disease is compatible

While m[illegible] *frontalis interna* is a clinical entity, my own experience has been that virtually every patient with this roentgenographic finding presents such a characteristic clinical picture that the diagnosis can be suspected before skull films are made I agree with Grollman and Rousseau "From a clinical standpoint the disease does represent a definite entity which when taken in conjunction with specific roentgenologic findings may be differentiated as a distinct disease process"

Unfortunately no specific treatment for this condition is known I have found it helpful to tell the patient's family, and sometimes the patient that the roentgenogram has revealed a condition that is not dangerous to life, but does explain her various symptoms Aspirin or other analgesics may be used for the headache, and mild sedation with phenobarbital or one of the modern tranquilizers may give some symptomatic relief

shoulder," adhesive bursitis, periarthritis of the shoulder) is caused by adhesions obliterating the subdeltoid bursa and adhesive inflammation between the joint capsule and the articular cartilage It may originate from inflammation of the long head of the biceps, or may follow trauma or prolonged immobility of the joint Frequently it occurs as a sequel of myocardial infarction

The onset is gradual and is characterized by slowly increasing pain and stiffness in the joint, with loss of motion and muscle spasm and atrophy The roentgenogram shows atrophy of the greater tuberosity It is sometimes difficult or impossible to distinguish adhesive peritendinitis from the shoulder-hand syndrome—and indeed the former may represent an advanced form of the latter

The treatment of "frozen shoulder" is not too satisfactory Roentgen therapy seldom helps In some cases it may be necessary to break up the adhesions under anesthesia and to employ first passive and then active exercises several times a day in order to keep them from reforming In milder cases, intracapsular injections of hydrocortisone may give enough relief from pain to permit a restoration of function.

Paget's Disease (Osteitis Deformans)

Paget's disease is a comparatively rare condition characterized by increased bone destruction and increased bone formation It is seldom seen before the age of 35, but the incidence increases after that age It usually involves the skull and the weight-bearing bones the sacrum femur, pelvis, and tibia It is said to be more common in men (Bauer and Bartter, 1955) The etiology is unknown, but the condition is frequently associated with deafness and advanced arteriosclerosis It is a localized rather than a generalized bone disorder The increased blood supply required by the bones involved may cause cardiac hypertrophy and eventually lead to congestive failure The best known clinical manifestations of Paget's disease are bowing of the tibias and enlargement of the skull Whether or not there is pain depends upon the site and extent of the disease The course of the disease is variable It may be stationary for years or it may rather rapidly cause marked deformity and crippling The principal complications are spontaneous fracture, sarcoma, and con-

gestive heart failure There is no known treatment of the primary disease, although the complications must receive appropriate therapy

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While many writers do not believe that *hyperostosis frontalis interna* is a clinical entity, my own experience has been that virtually *every patient* with this roentgenographic finding presents such a characteristic clinical picture that the diagnosis can be suspected before skull films are made I agree with Grollman and Rousseau "From a clinical standpoint the disease does represent a *definite* entity which when taken in conjunction with specific roentgenologic findings may be differentiated as a distinct disease process"

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rather than aggravated by judicious exercise So far as possible, sources of tension should be eliminated by psychotherapy

Muscle Cramps

A fairly frequent affliction of older people is intense, involuntary tetanic contractions of the muscles, especially those of the legs These attacks usually occur at night and may awaken the patient The contractions last from a minute to as long as five or ten minutes

The etiology is not too well understood The attacks are more apt to follow unusual or prolonged exercise, chilling, or lying in an uncomfortable position They may be caused by irritation of the sciatic nerve, as from an osteoarthritic spur or a herniated nucleus They have been known to be present for some months or years following the removal of a herniated nucleus, and then gradually diminish in frequency and intensity The patient may obtain temporary relief by grasping the muscle firmly, by forcibly extending or flexing the foot, or by standing or walking for a few minutes

When muscle cramps recur frequently, quinine, 0 325 to 0 65 Gm (*5 to 10 gr*) at bedtime, may prevent them

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MUSCLES

Fibrositis

Fibrositis is a common condition in older people It is characterized by soreness, stiffness, and tenderness in the muscles or in the tissues around a joint If it involves the muscles, it is often called myositis or "muscular rheumatism" The areas most often affected are the back of the neck, the shoulders, the intercostal muscles, and the lower back Fibrositis is often persistent and uncomfortable, but it does not endanger life and is seldom disabling

Although fibrositis is recognized as a clinical entity, its etiology is still not known "Lacking a firm pathologic background and a definite diagnostic boundary, fibrositis has become the most controversial condition in the field of rheumatism" (Graham, 1955) Certain predisposing factors, however, are generally recognized Among these are fatigue, exposure to cold, prolonged inactivity, and nervous tension Acute infections, especially upper respiratory infections, often initiate generalized aching that may persist for some time

Fibrositis may be acute or chronic, and it is characterized by periods of remission and exacerbation The acute attacks often follow unusual exertion (to the point of fatigue), exposure to cold, acute infection, or emotional stress The pain, like that of hypertrophic arthritis is commonly worse after rest and may be relieved by moderate exercise

The diagnosis is usually made from the history, since there are no characteristic clinical findings such as redness or swelling over the affected tissues and no abnormalities detectable by laboratory tests and x-ray studies

The most important part of the treatment is seeing that the patient obtains the proper amount and kind of exercise Exercise that is too prolonged or strenuous may aggravate the condition The patient should be taught correct posture, and should exercise the affected muscles every day, stopping short of fatigue For relief of the pain, nonnarcotic analgesics containing aspirin may be prescribed, together with heat Reassurance is an important part of the treatment As in cases of degenerative arthritis, one should explain to the patient that the condition will not disable him, and is helped

rather than aggravated by judicious exercise So far as possible, sources of tension should be eliminated by psychotherapy

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CHAPTER 13

Abnormalities in Blood Pressure Associated with Age

ARTHUR GROLLMAN

Since the blood pressure constitutes a measurement readily obtainable in every physical examination, considerable attention is given to deviations from the expected normal for a given individual This emphasis on the level of the blood pressure is justified, since this variable hemodynamic function reflects to a great extent the state of the circulation

SIGNIFICANCE OF THE BLOOD PRESSURE

The blood pressure is determined by three hemodynamic functions namely the cardiac output, the elasticity of the vascular tree, and the peripheral resistance In the presence of an inadequate cardiac output, the blood pressure cannot be maintained without such compensatory changes as vasoconstriction and increased peripheral resistance (Grollman, 1957) This fact accounts for the drop in blood pressure often observed in previously hypertensive individuals following a myocardial infarction

Of particular importance in determining the level of the blood pressure is the elasticity of the arterial tree With senescence the blood vessels gradually lose their elasticity as a result of arteriosclerosis When this loss of elasticity is confined to small segments of the vascular tree, the effect on the systemic arterial blood pressure will be insignificant On the other hand, when it involves a large part of the circulatory system, as is the case in generalized atherosclerosis, the resultant effect on the level of the blood pressure is significant This loss of elasticity involving the arterial and,

to a lesser extent, the venous system results primarily in an increased systolic pressure with a normal or slightly decreased diastolic pressure The condition is designated as systolic hypertension in contrast to diastolic hypertension, which is characteristic of hypertensive cardiovascular disease The differentiation of these two conditions is important, for they are quite distinct pathogenetically and from the standpoint of prognosis and treatment (Grollman, 1951)

The elevation of blood pressure in generalized arteriosclerosis reflects an inherent change in the vascular tree and may be considered as a compensatory phenomenon, lowering the blood pressure by hypotensive agents is harmful and undesirable, since it entails either a reduction in cardiac output or other alterations that reduce the blood supply to the peripheral tissues (Grollman, 1958)

The third important factor determining the level of the blood pressure is the peripheral resistance Increase in this resistance constitutes the basic hemodynamic alteration in hypertensive cardiovascular disease It is characterized by an elevation in diastolic as well as systolic blood pressure, with a normal cardiac output (Grollman, 1951)

HYPOTENSION

Patients with a blood pressure less than that usually observed in persons of their age are often considered to be suffering from hypotension This concept is erroneous As has already been indicated the elevation in blood pressure associated with the aging process is a reflection of generalized arteriosclerosis, and although of frequent occurrence it is nevertheless abnormal (Grollman, 1957) In the absence of generalized arteriosclerosis or hypertensive disease the blood pressure would be expected to remain at the same level in the aged as in the young individual The finding of a pressure lower than the average for patients in the older age group is therefore not abnormal unless it is accompanied by some disturbance that lowers the blood pressure To designate such individuals as suffering from 'hypotension" and attribute unrelated symptoms to this condition is obviously an error Many patients who are apathetic or mentally depressed will have a blood pressure lower than the average for their age, in such individuals the blood pressure is

merely a reflection rather than the cause of their symptoms One must obviously exclude such conditions as Addison's disease and pituitary or myocardial insufficiency as causes of the observed hypotension

Sudden hypotension, particularly postural hypotension, which produces dizziness or faintness when the patient changes to the erect position, requires the exclusion of the various conditions responsible for this phenomenon Pressure on the carotid sinus, intermittent heart block, and ventricular asystole often produce such abrupt falls in blood pressure, which may cause fainting Hyperventilation also may induce a similar reaction, particularly in patients with heart disease and left ventricular failure who are pre disposed to syncope Exertion may precipitate such syncope, especially in patients with aortic stenosis or aortic insufficiency Failure of the autonomic mechanisms that mediate the adjustments in arte riolar tone and the response to changes in posture is also common in elderly persons suffering from generalized arteriosclerosis, and may result in syncope (Grollman, 1957)

ALTERATIONS OF BLOOD PRESSURE WITH AGE

The relationship of vascular changes to the aging process has long been recognized, and is the basis for the familiar statement that "a man is as old as his arteries' The fact that arteriosclerosis increases with age has long been evident from necropsy studies It is now recognized that this change in the blood vessels begins at birth and may become evident in youth, while rarely it may not appear to any significant degree in aged individuals To what extent this alteration in the blood vessels results from the inevitable aging of protoplasm and to what extent it is influenced by dietary and other factors is not yet entirely defined That such changes may be accelerated by disease processes such as hypothyroidism and diabetes, however, is well established It is also recognized that there is no true parallelism between the vascular changes and senility, since many symptoms of the aging process are apparently independent of alterations in the blood vessels (Mueller Deham and Rabson 1942)

Although there is a gradual increase in the level of the blood pressure from childhood to old age, the systolic pressure does not

to a lesser extent, the venous system results primarily in an increased systolic pressure with a normal or slightly decreased diastolic pressure. The condition is designated as systolic hypertension in contrast to diastolic hypertension, which is characteristic of hypertensive cardiovascular disease. The differentiation of these two conditions is important, for they are quite distinct pathogenetically and from the standpoint of prognosis and treatment (Grollman, 1951).

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HYPOTENSION

Patients with a blood pressure less than that usually observed in persons of their age are often considered to be suffering from hypotension. This concept is erroneous. As has already been indicated, the elevation in blood pressure associated with the aging process is a reflection of generalized arteriosclerosis, and although of frequent occurrence it is nevertheless abnormal (Grollman, 1957). In the absence of generalized arteriosclerosis or hypertensive disease the blood pressure would be expected to remain at the same level in the aged as in the young individual. The finding of a pressure lower than the average for patients in the older age group is therefore not abnormal unless it is accompanied by some disturbance that lowers the blood pressure. To designate such individuals as suffering from "hypotension" and attribute unrelated symptoms to this condition is obviously an error. Many patients who are apathetic or mentally depressed will have a blood pressure lower than the average for their age; in such individuals the blood pressure is

the excretory function of the kidneys remains relatively satisfactory. When arteriosclerosis of the renal vessels involves the arterioles, however, the resultant interference with the function of the kidney leads to the development of uremia. This condition is observed in about 10 to 15 per cent of patients suffering from hypertensive disease, and is the immediate cause of their death.

DISORDERS OF THE KIDNEY

Although the theory has not been generally accepted, the available evidence indicates that hypertensive disease is always secondary to a disturbance in renal function (Grollman, 1957). According to this view, the kidney, in addition to functioning as an organ of excretion, is responsible for maintaining the normotensive state. Experimental studies support the view that even the so-called "essential" hypertension, in which excretory function is normal and no disturbance of the kidney is demonstrable morphologically, represents a disturbance in the kidney's function of maintaining the normotensive state (Grollman, 1957). It is thus logical to include in the present chapter a consideration of disorders of the kidney as they affect the older age group.

[illegible] the kidney is relatively normal [illegible] decrease in size and a reduc- [illegible] (Mueller-Deham and Rabson, 1942). Functionally, however, there may be loss of the capacity to form a very concentrated urine. Arterial and arteriolar sclerosis, as we have already seen, is frequently encountered; the former may give rise to hypertensive disease, while the latter may result from long-standing *hypertension*. Nephrosclerosis may induce a loss of renal substance, producing the so-called "contracted" kidney, with albuminuria and variable degrees of renal excretory insufficiency. Polyuria and nocturia reflect the loss of the kidney's concentrating power. Ultimately, if the process continues, renal failure culminates in uremia.

Renal disorders in the *aged* present no special problems that are different from those associated with the same disorders in younger patients. The incidence of the various forms of renal disease differs greatly, however, in the two age groups. As might be expected, disorders secondary to such vascular disturbances as nephrosclerosis

normally continue to rise after about the age of 70 nor the diastolic after 65 In general, the systolic pressure in women over 50 is higher than that in men, but after the age of 90 the difference is slight In 95 per cent of persons between the ages of 65 and 100 the systolic pressure ranges from 100 to 212 and the diastolic from 55 to 112 (Master, *et al*, 1958) The gradual slight decline in diastolic pressure and the constancy of the systolic pressure observed after the age of 75 are probably attributable to the selective morbidity and mortality associated with elevated blood pressures Only those with the lower values would be expected to survive to the higher age brackets

The arteriosclerosis characteristic of the aging process consists of *medial hyperplastic sclerosis with thickening of the medial layers* of the larger blood vessels This condition in itself is relatively asymptomatic, however, the loss of elasticity in the blood vessels increases the systolic blood pressure and adds to the work of the heart When calcification of this medial layer occurs, it is designated as Monckeberg's sclerosis A similar process involving the smaller arterioles is characteristic of hypertensive cardiovascular disease, and is observed eventually in all patients with sustained hypertension

Entirely different from the pathologic process just described is intimal sclerosis or atherosclerosis, in which there is thickening of the intimal layer of the vessels and hence narrowing of the lumen This process may involve certain localized areas, such as the coronary arteries, in which case it gives rise to coronary infarction when it involves other vessels, it may seriously compromise their circulation and function When the process affects the kidneys, it is designated as nephrosclerosis, a condition which, by interfering with the renal circulation, may give rise to hypertension (Grollman 1957) Hypertensive disease on the other hand, accelerates the development of medial hyperplastic sclerosis, hence the two conditions tend to aggravate each other and establish a vicious circle (Grollman, 1951) This accounts for the fact that one often encounters a combination of arteriosclerosis and hypertensive cardiovascular disease in the same patient

Sclerosis of the large renal vessels may give rise to atrophy of the parenchyma and fibrous displacement of the parenchymal tissue This condition is designated as benign nephrosclerosis since

the excretory function of the kidneys remains relatively satisfactory When arteriosclerosis of the renal vessels involves the arterioles, however, the resultant interference with the function of the kidney leads to the development of uremia This condition is observed in about 10 to 15 per cent of patients suffering from hypertensive disease, and is the immediate cause of their death

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In aged persons who are healthy, the kidney is relatively normal morphologically except for a slight decrease in size and a reduction in the number of glomeruli (Mueller-Deham and Rabson, 1942) Functionally, however, there may be loss of the capacity to form a very concentrated urine Arterial and arteriolar sclerosis, as we have already seen is frequently encountered, the former may give rise to hypertensive disease, while the latter may result from long standing hypertension Nephrosclerosis may induce a loss of renal substance producing the so called "contracted' kidney, with albuminuria and variable degrees of renal excretory insufficiency Polyuria and nocturia reflect the loss of the kidney's concentrating power Ultimately if the process continues, renal failure culminates in uremia

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are more common in the aged On the other hand, acute glomerulonephritis, which is generally accepted as a disease resulting from an allergic response to previous infection, is so rare in the aged as to warrant *only mention here* It may occur in a mild transient form following a sore throat or some other streptococcal infection, or as a diffuse involvement producing massive albuminuria, hematuria and cylindruria When chronic nephritis manifests itself for the first time in the aged, it is believed to be a result of unrecognized infection at an early age The nephrotic syndrome, except as a manifestation of intercapillary glomerulosclerosis, is extremely rare in the aged Pyelonephritis and other renal infections are not uncommon in old age, but they will be considered in Chapter 18

Prostatic hypertrophy, common in men over 50, results not only in obstruction to urinary flow but, as Olbrich and his co workers (1957) have shown, also causes a reduction in renal plasma flow and glomerular filtration In the absence of urinary tract infection however, tubular function is not affected This reduction in renal function produces only a slight elevation in the concentration of urea in the blood The problem of hydronephrosis as well as that of renal calculi and hematuria, is discussed in *Chapter 18 Other* conditions that may interfere with the excretory function of the kidney as well as with its function of maintaining a normal blood pressure are vascular nephritis (including nephrosclerosis, which has already been discussed in relation to hypertension) and other vascular disturbances of the kidney among them periarteritis and other collagen disorders, and Cushing's disease, which may induce vascular damage

TREATMENT

The treatment of hypertension in the aged calls for certain special considerations As has already been indicated an elevation in systolic blood pressure reflects generalized arteriosclerosis and should not be treated *by hypotensive agents If these are effective* in lowering the blood pressure, they may induce alarming disturbances The rauwolfia alkaloids commonly used in younger hypertensive subjects are particularly apt to elicit undesirable side effects nightmares, depression, and so forth, in the aged (Grollman 1960). Attempts to alter the progression of the arteriosclerotic process by such means as the exclusion of cholesterol *from the*

diet or the administration of hormones and unsaturated fatty acids must still be considered to be in the experimental stage, and they are not recommended for general application At present only symptomatic measures are available for the palliation of disturbances arising from the arteriosclerotic process

The treatment of hypertensive cardiovascular disease in the aged as in patients of the younger age group remains empirical (Grollman 1960) Such radical procedures as sympathectomy are generally considered undesirable in patients over 50 years of age The hypotensive drugs which are widely used in the younger age group fail to modify the basic disturbance responsible for the disorder and merely alter one of the manifestations of the disease, namely the elevated blood pressure The desirability of using these drugs except in the malignant phase of the disease is questionable Since this stage of the disease rarely occurs in old age the use of the presently available drugs is seldom justified in the aged When they are used extreme care must be taken to avoid the side effects, which may be poorly tolerated by the older patient (Grollman 1958) Until a more basic and specific therapy becomes available the treatment of hypertensive cardiovascular disease in the aged must be directed primarily toward reassurance the avoidance of potentially harmful stresses and the use of the usual symptomatic measures for such complications as heart failure or other consequences of the disease

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Hospital in St Louis This report revealed a twentyfold increase in the incidence of myocardial infarction in the decade from 1945 to 1954 as compared with the period from 1910 to 1919

One can conclude that the over all incidence of coronary heart disease is probably on the increase and that susceptibility of the female past the menopause approaches that of the male

Etiology

Coronary artery disease becomes manifest when narrowing of a coronary vessel progresses to such a degree that there is insufficient blood flow to the dependent area of myocardium Many theories have been offered to explain the development of coronary arteriosclerosis and several hypotheses will be discussed briefly

ETHNIC AND GEOGRAPHIC FACTORS The fact that coronary artery disease has a greater incidence among the Caucasians than among the Negroes is generally conceded In several large series the incidence of coronary artery disease among the Caucasians was found to be from two to five times greater than that among Negroes Epstein *et al* (1957) in a study conducted in New York City, found the incidence of manifest coronary artery disease almost twice as great in Jewish men (15 8 per cent) as in Italian men of similar social and economic status (7 9 per cent) It is interesting to note that the Jewish group had a higher intake of animal fat and were found to have higher cholesterol values also This study may support an ethnic factor in the etiology of the disease or on the other hand may only reflect differences in the diets of these two groups

In Japan China and certain areas of South Africa and among the Eskimos in Alaska the incidence of coronary artery disease is significantly less than in other sections of the world An ethnic explanation for this difference has been challenged and some investigators believe that this observed discrepancy in the incidence of coronary artery disease is due solely to dietary factors Conclusive evidence regarding this matter is still not available although the dietary findings of Keys and others are certainly provocative

A familial factor in the incidence of coronary artery disease has long been recognized and has been particularly striking in our experience

CHAPTER 14

Diseases of the Heart

C GLENN SAWYER and ROBERT N. HEADLEY

ARTERIOSCLEROTIC HEART DISEASE

Heart disease resulting from arteriosclerosis of the coronary arteries is the major cause of disability and death in the older age group, and is the most common form of heart disease in patients past the age of 45

Incidence

Master, *et al* (1939), in their series, found the average age of patients having their first *myocardial infarction to be 51 years* Males were affected more frequently than females, in a ratio of 8 1 Although it is generally agreed that coronary artery disease has a predilection for the middle-aged male, Thomas (1957), reporting on 17,000 autopsies during the period from 1910 to 1951, found that in the older age group women were affected to a greater degree than men During the same period, however, the incidence of myocardial infarction was found to be higher in the younger male *than in his female counterpart*

Is the incidence of coronary artery disease increasing? It has been suggested that the observed increase is more apparent than real and may be attributed to three factors (1) increased awareness of the entity on the part of the practicing physician, (2) vastly improved diagnostic techniques, and (3) the increasing life expectancy, resulting in a larger bracket of persons in the older age group Conflicting with this hypothesis is the report by Lee and Thomas (1956a) *on 8,183 adult autopsies performed at the Barnes*

Keys (1954) has shown that, in Italian firemen and policemen, whose average fat intake is 20 per cent of the diet, the blood cholesterol no longer continues to rise after the age of 30 In a comparable group of Midwestern businessmen, whose fat intake was approximately 40 per cent of their diet, the serum cholesterol continued to rise after the age of 30 Keys (1956) also has stated rather dogmatically that more coronary heart disease is encountered in populations where a high serum cholesterol (above 220 mg per 100 cc) prevails in middle aged men He also has found that blood lipids, especially cholesterol β protein fractions, appear to be higher in patients with myocardial damage than in normal individuals

The evidence suggests that the diet, especially the fat constituents play some role in the etiology of arteriosclerosis This issue is still far from being settled, however, and in the light of present knowledge drastic dietary changes for the general population cannot be enthusiastically advocated

HORMONES Some authorities believe that more emphasis should be directed toward endocrine factors in the etiology of coronary arteriosclerosis It is well known that myocardial infarction is uncommon in women prior to menopause, but significantly greater in women who have passed the menopause or who have had bilateral ovariectomy It has been reported that adrenal, *thyroid, and estrogen preparations will reduce high serum cholesterol levels In males* with high serum cholesterol levels and coronary artery disease, good results have been reported from estrogen administration and even castration but these therapeutic methods have not been widely accepted

One cannot say with certainty which etiologic factor is most important in the genesis of arteriosclerosis There is good evidence, however that any or all of the above factors can play a role in its production

Pathology and Pathogenesis of Arteriosclerosis

By definition arteriosclerosis means hardening of the arteries and is derived from the Greek word *scleros,* which means "hard" According to Anderson (1957), *three types* of arteriosclerosis can be recognized The degenerative and proliferative changes usually

Hypertension. Hypertension is a common antecedent of coronary heart disease. It has been stated that hypertension is found in 50 to 75 per cent of the patients with coronary artery disease. In one series reported by Master, Dack, and Jaffe (1939), 80 per cent of the females with coronary artery disease had hypertension, as compared with only 56.5 per cent of the males. The association of coronary artery disease and hypertension is thought to increase with age.

Diabetes. The development of coronary artery disease is believed to be accelerated in diabetic patients. In the series reported by Master, Dack, and Jaffe (1939), diabetes was present in 11.2 per cent of the patients with myocardial infarctions, whereas the incidence of diabetics and prediabetics in the general population is approximately 3 per cent.

Obesity. It has generally been assumed that obesity predisposes one to heart disease, but recently this assumption has been disputed. Lee and Thomas (1956b) believe that body weight does not materially influence the prognosis of an acute myocardial infarction, nor does it affect the time of onset. Many would disagree with this viewpoint, and it is generally conceded that extreme obesity increases the work load on the heart and would, therefore, be a detrimental factor in a patient with myocardial insufficiency owing to coronary artery disease.

Dietary Factors. In recent years, emphasis has been placed on dietary factors, especially fat, as being important in the pathogenesis of arteriosclerosis. Page, *et al.* (1957) believe that the fat consumption should not exceed 25 to 30 per cent of the caloric intake and that a high percentage of this fat consumption should ideally be in the unsaturated form. They also believe that this high proportional consumption of unsaturated fatty acids as opposed to the saturated fats is necessary for the maintenance of a normal serum lipid value. Ahrens and his group (1957) agree that unsaturated fats in the diet lower the serum cholesterol and serum phospholipid content, but they question the effect of dietary fat intake on atherogenesis.

Furman (1957) reported that, when the fat intake exceeds 40 per cent of the day's caloric intake, the serum cholesterol will in time rise above 225 mg. per 100 cc. and arteriosclerosis will eventually develop.

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With the progressive narrowing of a vessel lumen the hypoxia of the heart muscle itself especially during times of increased cardiac demand may stimulate the production of collateral vessels If at the time of increased cardiac demand the vessel lumen is unable to supply enough blood anginal pain usually occurs

Angina Pectoris

Angina pectoris is heart pain due to myocardial ischemia It results when there is insufficient coronary flow to an area of the heart and characteristically occurs during exercise or emotional tension Typical anginal pain is retrosternal in location radiating usually over the precordium toward the left upper extremity and less commonly to other adjacent areas It is most often brought on by activity but may be precipitated by emotional stress ingestion of a heavy meal cardiac arrhythmias or exposure to cold The duration is variable but anginal attacks usually last from a few seconds to a few minutes Characteristically the pain can be alleviated by nitroglycerin sublingually It is frequently described as being a tight or compressing type of discomfort rather than a sharp or sticking pain This discomfort is constant and is aggravated by continuation of the activity It is usually relieved by rest The physical changes associated with the acute episode are variable and may even be absent An elevated blood pressure is detectable sometimes but not always The pulse rate is frequently accelerated but may be unaltered Slowing the heart rate by holding the breath or applying unilateral carotid pressure will frequently abate the pain

The diagnosis of angina pectoris can usually be established by a careful history and physical examination even in the absence of [illegible]

[illegible] wave The standard leads and left precordial leads are the areas of choice for detection of this change

If the electrocardiogram is normal and if the diagnosis of angina pectoris is uncertain an exercise test for evaluation of the cardiac reserve can be attempted In approximately 80 per cent of the cases the classical Master two step exercise test (1957) will provoke the characteristic changes in the electrocardiogram The

found in larger arteries consist of lipoid and fibrous containing plaques in the intima and are designated 'atherosclerosis' This term was coined by Marchan in 1904 from the Greek word *athero* which means "mush" It is the most common form of arteriosclerosis and is the type usually seen in the coronary arteries

The second type of arteriosclerosis is medial calcification of Monckeberg This affects primarily the muscular arteries for example, the radial temporal, tibial, and femoral arteries In this type of arteriosclerosis, hyaline fatty degeneration can be found in the media of the artery This change is frequently followed by necrosis and calcium deposition In the third type, arteriolar sclerosis the intima or media is involved by hypertrophy, hyalinization or both Arteriolar sclerotic changes in the myocardium have been incriminated in some cases of idiopathic myocarditis, but a clear cut correlation has not been demonstrated

It is unfortunate that the coronary vessels are primarily end arteries in all but approximately 9 per cent of the general population The absence of intercoronary collateral circulation, unless this has been previously provoked, explains the severe consequences resulting from occlusion of even a small coronary radical If the occlusion is complete, total infarction of the dependent area results

Pathologic Physiology

As arteriosclerotic changes of the coronary arteries take place, the blood flow to the myocardium supplied by the involved vessels may be decreased If the lumen of the coronary vessel becomes so narrowed that the blood flow is not great enough to meet the demands of the dependent area of the heart coronary insufficiency occurs and anginal pain is experienced If the arteriosclerotic changes progress so that the vessel becomes occluded myocardial infarction of the tissue distal to the occlusion occurs The occlusive episode is frequently precipitated by hemorrhage into an intimal atherosclerotic plaque, with resultant thrombosis of the vessel or, more rarely, is due to embolization If sufficient intercoronary anastomoses or collaterals are present, coronary occlusion may take place without myocardial infarction If occlusion of the nutrient vessel causes anoxia in a sufficiently large area of the heart death of the myocardium will result

With the progressive narrowing of a vessel lumen, the hypoxia of the heart muscle itself, especially during times of increased cardiac demand, may stimulate the production of collateral vessels. If, at the time of increased cardiac demand, the vessel lumen is unable to supply enough blood, anginal pain usually occurs.

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patient is prepared as for a basal metabolism test, and the baseline electrocardiogram is made The patient is then required to climb two 9 inch steps for a set number of times, and a postexercise electrocardiogram is taken Depression of the S-T segment, conversion of an upright T wave to a diphasic or inverted T wave, or development of block is a pertinent change An S-T segment depression of more than 0 5 mm in any lead is considered a positive result T wave changes would help to confirm the diagnosis but in the absence of an S-T segment depression would be nondiagnostic

Angina pectoris is sometimes confused with costochondritis, gastrointestinal disturbances, neurocirculatory asthenia, the scalenus anticus syndrome, pericarditis, aneurysm of the aorta, and most frequently, psychoneurosis Other conditions may occasionally cause difficulty in the differential diagnosis

The treatment of angina pectoris will be considered in the general discussion of the convalescent stage of myocardial infarction

Coronary Occlusion with Myocardial Infarction

In this discussion, the term "coronary occlusion" is used to indicate sudden obstruction of a coronary artery as the result of an underlying arteriosclerotic process When sudden occlusion of a coronary vessel occurs, necrosis of the distal cardiac tissue takes place unless there is sufficient collateral circulation to the area

The clinical picture of acute coronary occlusion is rather classical The pain is similar in location to that of angina pectoris but is much more severe and of longer duration It is classically retrosternal in location with radiation over the precordium frequently to the left upper extremity, and not uncommonly to the right upper extremity Radiation bilaterally into the arms and wrists and up into the neck or jaw is a valuable diagnostic aid The pain commonly is severe and crushing Occasionally it is only moderately disabling but is persistent and disturbing in character If the patient has had angina pectoris, he may attribute the pain of coronary occlusion to this condition A differential feature is the duration of the attack, the pain of myocardial infarction may last for hours unless abated by a generous amount of narcotics Furthermore, angina

is usually associated with activity or stress such is only occasion ally the case with infarction Myocardial infarction without pain is rare and is thought to occur in less than 5 per cent of all cases of coronary occlusion

Although pain is the dominant feature in most instances of myo cardial infarction coexisting complications are numerous One of the most frequent is shock When this occurs the prognosis is al ways guarded During an acute episode of pain the patient may become weak and experience syncope Upon initial examination the patient may be in profound shock or in the milder cases may only be dizzy or weak pale cold and sweaty Respirations may be shallow and the pulse weak and rapid

Shortly after the acute episode of coronary occlusion cardiac failure may occur In such cases physical examination may reveal venous distention pulmonary rales indicative of pulmonary con gestion hepatomegaly and peripheral edema If pulmonary con gestion is present the patient will be dyspneic orthopeneic and at times cyanotic

The development of cardiac arrhythmia following an acute coro nary occlusion with myocardial infarction is indeed an ominous sign Any arrhythmia may be encountered but premature ventricu lar contractions are most common

Fever generally occurs between 24 and 48 hours after the acute insult The duration of fever is variable but it usually subsides within two to five days Prolonged fever may indicate a compli cation

Physical examination at frequent intervals following a myo cardial infarction is mandatory No pathognomonic auscultatory findings are encountered after the acute episode but variable sys tolic murmurs particularly at the base of the heart are described In our experience transient soft basal diastolic murmurs are not infrequent The heart sounds may be somewhat muffled or faint A gallop rhythm usually diastolic in time is significant In 20 to 30 per cent of the cases a pericardial friction rub is audible usu ally two to three days after the acute episode Pericardial rubs may be transient and this is a point of some value in the differential diagnosis of infarction and acute idiopathic pericarditis With the latter condition the pericardial rub is usually of longer duration

The blood pressure usually shows a progressive decrease following myocardial infarction, and will frequently remain at a lower value after the patient recovers

Laboratory studies performed on the patient's blood are of variable significance In our experience, the most useful enzyme procedure has been the determination of lactic dehydrogenase (MacDonald, *et al*, 1957) The advantage of this test is that the enzyme is present as early as 24 hours after the initial episode and persists for 6 to 8 days thereafter This test is particularly useful when electrocardiographic findings are not diagnostic The major disadvantage is that elevation of lactic dehydrogenase may also be found in hepatocellular necrosis, metastatic carcinoma, hemolytic anemia malignant lymphoma, and infectious mononucleosis One must be careful when the blood sample is drawn to avoid hemolysis of the red blood cells, erythrocytes are high in lactic dehydrogenase content, and then hemolysis will produce a falsely high enzyme determination

Another useful enzyme study is the determination of glutamic oxalacetic transaminase (Ostrow, *et al*, 1957) The serum lactic dehydrogenase determination, however, appears to have three distinct advantages over this test (1) The enzyme level rises promptly and stays elevated longer, (2) it is less sensitive to other sources of error and (3) it is a less complicated procedure In the future, a battery of serum enzymatic determinations will probably prove valuable in the differential diagnosis of myocardial infarction

Other laboratory findings are helpful but not specific for this condition Leukocytosis is usually detectable within two to three hours after the insult An increase in the erythrocyte sedimentation rate occurs within two to three days and may persist for weeks Of lesser diagnostic significance is an increased amount of C reactive protein

The radiographic findings in acute myocardial infarction are nonspecific, but a chest film may show cardiomegaly and rarely abnormal pulsations of the left cardiac border

Serial electrocardiograms are invaluable when correlated with the clinical observations Classically the two major areas of infarction, as determined by the electrocardiogram, are anterior and posterior Anatomically, the posterior infarction is more nearly

posteroinferior or diaphragmatic in location Not infrequently, an anterolateral, anteroseptal, or subendocardial infarction can be detected by the electrocardiogram

The electrocardiographic findings usually associated with an anterior wall infarction (Q1 — T1 pattern) include elevation of the S T segment in lead 1 and occasionally in lead 2, and depression of the S T segment in lead 3 Subsequently, the T wave in lead 1 becomes diphasic or inverted The diagnostic feature in the electrocardiogram is the appearance of a Q wave in lead 1 and occasionally in lead 2 In a massive anterior infarction, a significant Q wave can be found in a variable number of the precordial leads To be significant, the Q wave should be more than 2 mm in depth or greater than 20 per cent of the R wave in the standard leads, and at least 04 seconds in duration A significant elevation of the S T segment should be greater than 1 mm in the standard leads and 2 mm in the precordial leads Generally speaking, the elevation of the S T segment is thought to represent current of injury, and the T wave change to indicate myocardial insufficiency The Q wave is thought to signify death of the myocardial tissue

In the classical posterior wall infarction (Q3 — T3 pattern), there is an elevation of the S T segment in lead 3 and frequently in lead 2 with reciprocal depression of the S T segment in lead 1 In lead 3 and frequently in lead 2 the T wave becomes lower, and eventually diphasic or inverted A significant Q wave appearing in lead 3 is diagnostic and as previously stated indicates myocardial death Elevation of the S T segment, with changes in the T wave and in the appearance of the Q wave, may take place in AVF, and this is compatible with a posterior myocardial infarction If the infarction extends laterally into the left ventricle, S T and T wave changes may be noticeable in leads V4 to V6, depending on whether the extension is more anterior or posterior

If the anterior portion of the interventricular septum is involved, changes should be evident in the precordial leads primarily V2, V3 and V4

Death following a myocardial infarction may be due to one or several complications The most frequent are shock, heart failure with passive congestion arrhythmia, and pneumonia Myocardial rupture and perforation of the interventricular septum are less common

The conditions to be ruled out in the diagnosis of acute myocardial infarction are acute pericarditis, angina pectoris, dissecting aortic aneurysm, pneumothorax, pulmonary embolus, and, less frequently, perforated peptic ulcer, acute pancreatitis, and acute cholecystitis

The treatment of an acute myocardial infarction depends upon the specific individual course Friedberg (1956) emphasizes that the principles of management should include reduction of the cardiac work load until the injured areas heal, the alleviation of pain and other discomfort, the prevention and treatment of shock and cardiac failure, and the prevention, if possible, of other serious complications The control of pain and of the patient's apprehension is of utmost importance Morphine is the most effective narcotic available, and has the additional advantage of producing in most individuals a sense of euphoria It has, however, the objectionable feature of nauseating a great many patients, and the violent retching sometimes induced puts a real strain on the weakened myocardium For the patient who has been found by previous experience to tolerate it well, morphine is the drug of choice However, if the patient's reaction to it is not known or if he has been nauseated by it in the past, Dilaudid (2 to 4 mg), methadone (10 to 15 mg), or Demerol (100 to 150 mg) would be preferable Any of these drugs, as well as morphine, may be given intravenously for quicker effect The continuing periodic administration of narcotics for the control of pain and apprehension is mandatory, and around-the clock sedation is often necessary to reduce the patient's anxiety and to maintain a near basal state

If shock is present, vasopressor drugs such as L-arterenol (Levophed) in a solution of dextrose in water may be lifesaving The rate of infusion should be regulated so as to maintain a satisfactory blood pressure and renal flow When a vasopressor substance is being administered, a competent person should be in constant attendance to regulate the rate of infusion, for excessive hypertension at this time might increase the risk of myocardial rupture

Oxygen is frequently employed during the acute episode and may be beneficial Because of the refreshing effect on the patient, an oxygen tent may be superior to nasal oxygen Digitalis should not be used at this stage unless cardiac failure develops or is impending Even then, the therapeutic effort is often disappointing

Sodium restriction is clearly of value and should be invoked Diuretics will probably be more beneficial in such cases than digitalization Whereas some authorities consider absolute bed rest imperative the bed chair regimen advocated by Levine (1952) has gained favor in certain areas The latter program which is thought to decrease the risk of thromboembolic episodes and also to decrease the work load of the heart requires adequate man power for transport of the patient The patient should be allowed only restricted activity He should be fed bathed shaved and assisted with any changes in position There is disagreement about the wisdom of allowing the use of a bedside commode rather than a bedpan but the patient should be adequately assisted with either

Anticoagulant therapy appears to be useful in all patients with a history of previous infarction or with any complications intractable pain shock heart failure or arrhythmias It is debatable whether anticoagulant therapy is indicated in the so called good risk patient and this decision is probably up to the individual physician handling the case Since it is frequently difficult to differentiate clinically between "good risk" and "bad risk patients it has been our general policy to employ anticoagulant therapy in all cases of myocardial infarction when no obvious contraindications exist

The choice of a specific anticoagulant depends on the physician s experience If [illegible]
insult [illegible]
factors [illegible] anticoagulation is needed heparin is the drug of choice for initiating therapy with possibly a subsequent change to a Dicumarol like anticoagulant In general it appears that the latter group of anticoagulants is more easily handled by the average practitioner than is heparin The physician however should acquaint himself with the therapeutic and toxic effects of both heparin and at least one Dicumarol like anticoagulant so that he can administer either drug with confidence as it is needed

After the acute stage is passed the long term management of a myocardial infarction calls for consideration of more minor details The consistency of the diet should be varied according to the patient s condition and bowel regularity Maintaining regular bowel

habits and giving foods of soft consistency will safeguard the patient against unnecessary effort If he can forego the use of tobacco without undue anxiety, we believe this is desirable Alcohol given orally, especially in the form of a hot toddy at bedtime, often has a sedative effect and provides a treat for the patient The routine administration of digitalis is not to be used, but it should be given if the patient develops cardiac failure Quinidine is especially useful in the control of ventricular extrasystoles, which are usually multifocal, and other arrhythmias known to respond to this drug The administration of diuretics and antibiotics is dictated by the patient's clinical course

The management of the convalescent phase is not well defined Authorities differ on the rapidity of mobilization, and no rigid schedule can be advocated in this discussion It does seem wise, however, to restrict the patient's activity rather markedly during the first 14 days, since healing of the acute infarction with fibrosis is thought to take place within this time Following this initial, potentially dangerous period, the patient may be allowed first to sit on the edge of the bed and then later to sit in a bedside chair for short periods daily, gradually increasing in duration After four to five weeks of hospitalization, the patient should be ambulatory to the extent that he can be transferred home, provided his medical and physical needs can be met there If he is to remain in bed, active movement of the lower extremities should be encouraged in order to reduce the hazard of thrombophlebitis with subsequent embolization In addition, there is clear-cut evidence that the incidence of thrombophlebitis and its complications has been significantly reduced by the use of a good anticoagulant program

No reliable prognosis can be given in a case of myocardial infarction Various authors place the mortality following the initial attack anywhere from 8 to 50 per cent It is generally agreed, however, that previous myocardial infarctions and the presence of cardiac arrhythmias, heart failure, shock, embolization, or pneumonia is a poor prognostic sign Richards, Bland, and White (1956), in a study of 200 patients with an initial myocardial infarction, found that 162 survived this episode Of this number, 19 per cent were living at the end of 5 years, 31 per cent after 10 years, 14 per cent after 15 years, and only 5 per cent after 20 years If a patient develops either angina or signs of congestive

eart failure following an initial myocardial infarction, his prognosis is less favorable

The prevention of subsequent myocardial infarctions presents challenge to the physician The aims of a medical approach to this problem might include (1) reduction of the serum cholesterol level if it is elevated (2) alleviation of the symptoms of coronary insufficiency and (3) restoration of the patient to a productive life, but with a program of moderation

In those individuals with hypercholesterolemia, dietary restriction of fat should be a foremost consideration, if a serious attempt at prevention of a subsequent myocardial infarction is to be made Shapiro Estes, and Hilderman (1957) reported a significant reduction in the serum cholesterol levels of six healthy male interns who were given a diet containing 30 Gm of animal fat and 70 Gm of corn oil This finding supports the speculation that consistent ingestion of unsaturated fatty acids will lower serum cholesterol values

Parsons and Flinn (1957) reported the prompt and sustained reduction of blood cholesterol in patients taking nicotinic acid in daily doses of 3 Gm or more No dietary restrictions were imposed on these patients The starting dose was 1,000 mg three times a day and this was increased if the serum cholesterol remained at pre existing levels Transient reactions to this high dose of nicotinic acid were encountered but were of only brief *duration*

Angina pectoris before and after myocardial infarction can at times become an intractable problem Many preparations for the control of anginal pain are available commercially Nitroglycerin has stood the test of [illegible] Initial doses of 0 3 m[illegible] gradually increased a necessary Occasional patients experience uncomfortable side reactions such as headache, dizziness, and even syncope and in such cases other less effective preparations may have to be substituted Amyl nitrite, inhaled briefly, may suffice in these instances

No long acting coronary dilator has been completely satisfactory in our experience but Peritrate (pentaerythritol tetranitrate) given orally three or four times a day seems to be the most useful adjunct for providing sustained alleviation of anginal discomfort Other long-acting coronary vasodilators which have enjoyed transient popu

larity are Metamine (aminotrate phosphate) and Nitroglyn (sustained-action nitroglycerin) Nitroglycerin, although effective for only a brief duration, still remains the drug of choice, but selection of a program best suited for each individual is necessary

The importance of returning the patient to a useful life following a myocardial infarction cannot be overemphasized The development of a cardiac neurosis following an acute episode is frequent, and, although the patient should not be allowed too much liberty regarding exercise, he should not be restricted and cautioned needlessly This precaution is wise in dealing with patients of all age groups, but especially with elderly patients, who may already believe that their purpose on earth has been fulfilled and that a vegetative existence is the path of least resistance Rehabilitation of the elderly postinfarction patient is every bit as important as rehabilitation of the middle-aged patient A basic understanding of this problem is mandatory for the practicing physician

The advisability of long-term anticoagulant therapy following a myocardial infarction is debatable According to Manchester (1957), *anticoagulant treatment should be continued following* discharge from the hospital only under three conditions (1) the patient must be co-operative, (2) frequent prothrombin determinations must be made, and (3) the physician must be competent and well acquainted with the pharmacology of the drugs utilized

If coronary vasodilators fail to relieve the anginal pain, the administration of radioactive iodine (I^{131}) may be indicated Blumgart and his co workers (1957) believe that the administration of radioactive iodine for angina pectoris is necessary in only about 5 per cent of the patients According to Hartigan and Fitzpatrick (1957), the rationale for administering radioactive iodine to patients with angina is based on the fact that decreasing the thyroid activity reduces the body's metabolic rate, thus diminishing circulatory requirements so that they more closely coincide with the limits of the patient's cardiac reserve The heart, therefore, performs less work and consumes less oxygen Blumgart, *et al* (1955), reporting on 1,070 patients with angina pectoris or congestive heart failure treated with I^{131}, stated that 75 per cent of the patients with angina and 60 per cent of the patients with congestive heart failure were benefited The dosage schedule was variable Six to 20 mc may be

given in divided doses at weekly intervals until the desired result is attained If myxedema develops desiccated thyroid may have to be administered Chapman (1952) has stated that the basal metabolic rate should be maintained at −25 to −35 the protein bound iodine at 2 to 3 μg per 100 cc and radioactive iodine uptake at 10 to 20 per cent in 48 hours

The surgical management of coronary artery disease is in an experimental stage and no definite conclusions have been reached It has been demonstrated that several procedures are beneficial in a few patients with coronary artery disease Operative procedures now being tried include pericardial injury, sympathectomy posterior rhizotomy omentopexy pericoronary neurectomy, and arterialization of the coronary sinus

It is our impression that pericardial abrasion and sprinkling of an irritant substance into the pericardial sac may be beneficial in some instances by stimulating the supply of blood vessels to the myocardium Lillehei s studies show that ligation of the internal mammary artery distal to the pericardial branch is not of long term benefit (*Effler et al* 1957)

Evaluation of the Beck I procedure has produced *some glowing reports* This procedure consists of four phases (1) pericardial epicardial abrasion (2) partial ligation of the coronary *sinus* (3) application of an inflammatory agent *and* (4) grafting of the mediastinal fat According to Mozen (1957) the *object of this operation is to* stimulate production of *intercoronary* anastomoses The mortality rate in his series of 71 *patients was 1 4* per cent, 50 per cent of his patients experienced early improvement and approximately 88 per cent became free of anginal pain

Beck and Brofman (1956) have stated that the Beck I procedure is designed for patients with angina *following* initial myocardial infarction (usually six *months or more after the* acute episode), and is rarely employed for prophylaxis The contraindications to this procedure would be congestive heart failure marked cardiomegaly, or retrogression of the *symptoms* of coronary insufficiency

Among the operative procedures that have been described in the literature more recently are the coronary endarterectomy advocated by Bailey and anastomosis *of the internal* mammary artery to the coronary sinus Neither of these procedures has been proved time

and experience will determine their worth. Many believe that no surgical procedure to date has been as productive of intercoronary anastomoses as has exercise alone.

RHEUMATIC HEART DISEASE AND CALCIFIC AORTIC STENOSIS

Although rheumatic fever is indeed rare in the older age group, there are documented reports of its onset in patients in their seventies (Grifone and Kitchell, 1954). Under these circumstances, the disease is almost always atypical and will have to be carefully differentiated from bacterial endocarditis and from occult neoplasm with fever. In the individual with unexplained fever, a sustained response to salicylate therapy is suggestive of rheumatic fever. In most cases of rheumatic fever, salicylates are as effective therapeutically as the steroids. Following the acute episode it is important that continuous penicillin prophylaxis be maintained, either orally in doses of 200,000 units daily or with a long-acting intramuscular preparation (Bicillin), 1.2 million units every four weeks. If the patient is allergic to penicillin, one of the sulfonamide compounds may be substituted.

Diagnosis of Rheumatic Heart Disease

Most patients with rheumatic heart disease have significant symptoms and many die before the age of 60. Appel and Kossmann (1951) have emphasized that the diagnosis of rheumatic heart disease is frequently missed in the aged. They reported that in 40 per cent of a group of patients with pathologically proved rheumatic heart disease, the diagnosis was overlooked during life. A careful history and physical examination, however, should enable one to make the diagnosis with a high degree of accuracy. Several features of the history are worthy of comment Has the patient had frequent sore throats, tonsillitis, chorea, or spontaneous epistaxis? Systolic murmurs are common in the elderly patient, but were any murmurs known to be present before the age of 50? Has chronic atrial fibrillation been present since the age of 45 or earlier? Is there a history of repeated episodes of hemoptysis? Has chronic congestive failure been present for more than two or three years? Have there

been systemic or pulmonary emboli? Have there been repeated syncopal episodes without observed changes in cardiac rhythm? Affirmative answers to any of these questions should prompt diligent search for physical evidence of rheumatic valvular disease.

Regardless of the patient's age, a careful physical examination remains the most valuable aid in the diagnosis of valvular heart disease. It is not our purpose to review the classical findings associated with each of the valvular defects, but certain features are worthy of emphasis. If an unequivocal opening snap of the mitral valve is heard, mitral stenosis is present and proper positioning of the patient should enable one to elicit the classic diastolic rumble. In general, mitral insufficiency is not severe unless the systolic murmur is at least a Grade 3 (on a scale of 6) and there is good radiation of the murmur into the left axilla.

The high pitched diastolic diminuendo murmur of aortic valvular insufficiency, which is heard best with the patient in maximal expiration and leaning forward, may be confused with syphilitic aortic insufficiency, with pulmonary valvular insufficiency secondary to pulmonary hypertension, or with the short, early diastolic blow often heard in the elderly patient with a tortuous, elongated aorta. The last condition can usually be excluded if the murmur is known to have been present for many years, and if the patient has a history of rheumatic heart disease. A wide pulse pressure with a collapsing peripheral pulse is compatible with aortic insufficiency and not with pulmonary insufficiency, although the murmurs produced by these two conditions may be indistinguishable on auscultation. The history, clinical course, and serologic test for syphilis will help to differentiate between luetic and rheumatic aortic valvular insufficiency.

Diagnosis of Calcific Aortic Stenosis

Calcific aortic stenosis merits special attention because it is primarily a disease of the elderly, and in some 50 per cent of the cases is preceded by known rheumatic fever.* Males predominate by a ratio of 3:1. Congestive failure is the most frequent manifesta

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when both can be satisfactorily done, is preferable to long term anticoagulant therapy for the prevention of further emboli

THYROTOXIC HEART DISEASE

In elderly patients with arteriosclerotic heart disease, either clinical or latent, thyrotoxicosis of long duration often precipitates congestive heart failure, cardiac arrhythmias, or angina The diagnosis of hyperthyroidism is not difficult when the classical clinical features are present In patients with congestive failure, however, these features may be masked or absent The appetite may be diminished because of passive congestion, and the loss of body weight may not be recognized because of the retention of fluid Patients with cardiac failure seldom have intolerance to heat

The diagnosis of thyrotoxic heart disease should be considered in any patient who has bouts of paroxysmal atrial fibrillation or chronic atrial fibrillation (particularly when rheumatic heart disease is not present) with a ventricular rate that fails to respond to adequate digitalization When chronic atrial fibrillation is due to thyrotoxicosis reversion to a normal sinus rhythm rarely can be achieved and maintained by the administration of quinidine Once the thyrotoxicosis is controlled spontaneous reversion to a sinus rhythm is common

Studies of the radioactive iodine uptake or determination of the protein bound iodine should enable one to confirm the diagnosis of thyrotoxicosis Since the basal metabolic rate is elevated in patients with congestive failure, this test is valueless in assessing thyroid function under these circumstances Occasionally a therapeutic trial with one of the antithyroid preparat[illegible] necessary [illegible]

[illegible] thyroidism [illegible] [illegible]pothyroidism are discussed in Chapter 20

ACUTE PERICARDITIS

Pericarditis is an inflammation of either or both of the covering membranes of the heart—the visceral and parietal pericardium

In the elderly patient, the most frequent causes of pericarditis are uremia and myocardial infarction Pericarditis may also result

tion although *syncope* or other transient manifestations of cerebral ischemia are not unusual Chest pain is common and often mimics *angina pectoris* although it is more apt to be unrelated to exercise or to follow exercise rather than accompany it

With regard to *physical findings* a major misconception is prevalent A small pulse pressure and plateau pulse are *not* the rule but are *infrequent findings* If these are used as criteria for the diagnosis of aortic stenosis most cases of calcific aortic stenosis will go unrecognized An aortic systolic murmur of Grade 3 intensity or more with an accompanying thrill and diminution or absence of the aortic *second sound* should lead one to suspect the diagnosis Electrocardiographic or roentgenographic evidence of left ventricular hypertrophy would *strengthen this suspicion* If present calcification of the aortic valve which is seen best and sometimes *only* under the fluoroscope is confirmatory

Treatment

Surgery for valvular defects resulting from rheumatic heart disease is rarely necessary in the geriatric patient and will never produce the gratifying results seen in the younger individual Too often there is associated coronary atherosclerosis with myocardial ischemia and areas of fibrosis Cardiac surgery is technically difficult in old people as the valves are generally calcified Both valve cleavage and restoration of valve mobility are difficult to achieve If however mechanical valve obstruction is severe and is a threat to life surgery should not be withheld Catheterization of the left and right sides of the heart may be necessary to assess this disability accurately

Most of the older patients who are handicapped by rheumatic heart disease can be satisfactorily managed by the measures discussed for congestive heart failure Several additional features are salient In order to prevent bacterial endocarditis these patients should receive therapeutic doses of penicillin at the time of any dental or operative procedure Continuous anticoagulant therapy should be considered when rheumatic heart disease is complicated by either chronic or refractory failure or by multiple emboli Under the latter circumstance if disabling mitral stenosis is present the performance of a mitral valvulotomy and left atrial appendectomy

roentgenograms may show a variation in heart size, a further radiographic aid in this diagnosis

Electrocardiographic findings in acute pericarditis include diffuse elevation of the S T segment, not localizable to a specific portion of the heart and without reciprocal depression of the S-T segment. The T waves tend to become flattened or diphasic, and the QRS voltage is usually diminished in amplitude Q waves do not develop, since death of myocardial tissue does not occur

Treatment is directed at the underlying disease or condition Pericardial aspiration is rarely necessary except in tuberculous pericarditis, which may require repeated pericardicentesis

CHRONIC CONSTRICTIVE PERICARDITIS

Chronic constrictive pericarditis is a dense, fibrotic thickening of the enveloping membranes of the heart, resulting in an impediment to normal diastolic filling It is often impossible to establish the etiology of this condition, but the agent most frequently incriminated has been tuberculosis Although chronic constrictive pericarditis is uncommon in the older age group, we have seen several cases in elderly patients

Congestive heart failure that has been present for several years and is only slowly progressive should immediately suggest the possibility of constrictive pericarditis The manifestations of congestive failure owing to chronic constrictive pericarditis are ascites, hepatomegaly and edema of the lower *extremities* Dyspnea at rest is uncommon and, in contrast to patients in chronic congestive failure resulting from arteriosclerotic heart disease, the patient is frequently comfortable flat in bed Anorexia weight loss, and exertional dyspnea are common complaints Examination may reveal venous engorgement and weak arterial pulsations The heart is smaller than would be anticipated from the degree of incapacity and congestive failure A paradoxical pulse, as previously described is frequently found In the late stages of this condition, where marked disability and failure exist, cyanosis may be present even at rest

The diagnosis of chronic constrictive pericarditis is difficult unless one maintains a high index of suspicion for this condition A

from bacterial or viral infections, from trauma, and rarely from malignant metastases. Benign, idiopathic pericarditis is uncommon in the patient past 60.

The acute phase of pericarditis may be manifested by chest pain somewhat similar to the pain of myocardial infarction. Since the pericardium itself has no sensory nerve distribution, this pain is usually pleural in nature and is intensified by coughing and deep breathing. It is frequently relieved by assuming the erect position whereas the pain of acute myocardial infarction is not affected by position. It is of interest that pain is absent in patients with uremic pericarditis. Other frequent manifestations of acute pericarditis are dyspnea, fever, sweating, weight loss, malaise, anorexia, and chills. At the onset of viral, bacterial, or idiopathic pericarditis the temperature may be 102 F or higher, whereas fever is most infrequent with the onset of a myocardial infarction.

On physical examination, a pericardial friction rub, to and fro in character, is usually detectable along the lower left sternal border. If underlying valvular disease exists, this friction rub may be confused with a heart murmur. A pericardial friction rub can often be heard best by using the diaphragm of the stethoscope, with the patient in the sitting position and leaning slightly forward. On percussion the finding of globular cardiomegaly, especially fullness at the base of the heart, may be indicative of pericardial effusion. If the pericardial effusion is large, an area of dullness and bronchial breath sounds may be detectable below the inferior angle of the left scapula posteriorly (Ewart's sign). The heart sounds themselves may also be muffled and faint. If cardiac tamponade is produced by the pericardial effusion, the venous pressure will be elevated and the arterial pressure lowered. It is interesting that in both constrictive pericarditis and cardiac tamponade, a paradoxical pulse may be present. This may be demonstrated as a diminution in pulse amplitude or as a decrease of 10 to 20 mm in the systolic blood pressure during the inspiratory phase of respiration.

Radiographically, a pericardial effusion produces a large, globular cardiac silhouette with loss of the angular contour. The supracardiac great vessel shadow becomes less elongated and somewhat widened as a result of fluid accumulation in this area. Fluoroscopic examination reveals decreased or absent cardiac pulsations. Serial

gether with indicator dye dilution studies should easily establish the correct diagnosis

To date, we have not repaired atrial septal defects in patients past the age of 50, although it is conceivable that surgery might be helpful to the older patient with persistent failure and without extreme pulmonary hypertension One should not anticipate, however, that elderly patients will show the dramatic postoperative improvement encountered in children

The presence of a *patent ductus arteriosus* may be suspected when there is a to-and fro machinery murmur maximal in the second left intercostal space parasternally, with radiation beneath the left clavicle and into the axilla This murmur is so characteristic that the diagnosis is usually made in childhood Two of our patients, however, were past 50 when satisfactory division and ligation of the ductus was performed

Occasionally a patient in the geriatric group will be found to have a *coarctation of the aorta* The hypertension above the coarcted segment accelerates the arteriosclerotic process, and as a result the vessels are very friable Surgery at this age is hazardous and not advisable

One may rarely encounter an elderly patient with an *interventricular septal defect* that has been tolerated well during the years Such defects are usually small in size and produce rather loud, coarse systolic murmurs with an accompanying thrill along the left sternal border Corrective surgery is not advisable or necessary in the elderly patient with a small, well tolerated interventricular septal defect

SUBACUTE BACTERIAL ENDOCARDITIS

The therapeutic aspects of both acute and subacute endocarditis have been discussed in Chapter 8 More than a third of the patients with subacute bacterial endocarditis *are past* the age of 45, and in this group the diagnosis is often difficult When the patient has a heart murmur, embolic phenomena, persistent fever, splenomegaly, a positive blood culture, and petechiae, there is no difficulty in diagnosis, this classical picture, however, may not appear until late in the course of the disease, if at all Gleckler's report on 10 elderly patients with endocarditis (1958) emphasizes the

relatively small heart as compared to the degree of failure should always suggest chronic constrictive pericarditis The diagnosis can often be made by the radiographic demonstration of calcification of the pericardium or by the finding of decreased or absent cardiac pulsations on fluoroscopic examination

The treatment for chronic constrictive pericarditis is surgical and consists in extensive decortication of both ventricles rarely do the atria or venae cavae have to be decorticated Because of the frequent coexistence of arteriosclerotic heart disease with areas of associated myocardial fibrosis and because atrophy of the myocardium results from the chronic compression of the heart improvement in cardiac function following operation may be slow in the older age groups Furthermore the chronic inflammatory process itself commonly causes areas of myocardial fibrosis Despite these factors decortication is mandatory and in time usually produces gratifying functional results

CONGENITAL HEART DISEASE

As a result of recent advances in diagnostic and surgical techniques most congenital heart defects are now accurately diagnosed and repaired during the early years of life The congenital heart lesion most frequently misdiagnosed in the geriatric age group is an *atrial septal defect* Many patients with this condition have a functional tricuspid stenosis producing a murmur similar to that heard with mitral stenosis In many instances a diastolic diminuendo murmur owing to insufficiency of the pulmonary valve can also be heard along the left sternal border and this may be confused with the diastolic diminuendo murmur that is associated with aortic insufficiency or pulmonary hypertension resulting from rheumatic heart disease In elderly patients atrial septal defects are often responsible for atrial fibrillation and congestive heart failure conditions that might easily be attributed to the far more common valvular deformities of rheumatic heart disease Atrial septal defect however would not produce left atrial enlargement and it would be associated with undue prominence of the pulmonary outflow tract and with more pronounced pulmonary vascularity particularly of the larger vessels than that seen with mitral stenosis If the differential diagnosis is in doubt cardiac catheterization to

nodosa resulting in congestive heart failure, pericarditis, and even myocardial infarction Libman Sacks' disease, a cardiac manifestation of lupus erythematosus, is a disease of young females and rarely, if ever, appears after the menopause Scleroderma is usually a cutaneous disease, but may infrequently affect the heart Other rare conditions that may cause congestive heart failure are idiopathic myocarditis, endocardial fibroelastosis, sarcoidosis, amyloidosis involving the heart itself, and myxoma of the left atrium

Acute Failure

Clinically, one can divide heart failure into two phases the acute and the chronic Acute congestive heart failure can occur within a matter of minutes or hours, and is usually manifested by marked dyspnea, cough orthopnea, extreme apprehension, and frothy, pink sputum The objective findings are basilar pulmonary rales distention of the neck veins, engorgement of the liver, ascites, and peripheral edema Most patients with congestive failure are more comfortable either [illegible] position permits

[illegible] with the pre

dominant manifestations of the individual case Demerol, Dilaudid, methadone or morphine is especially beneficial in the acute phase in order to allay anxiety, slow the respiratory rate, and depress the cough reflex Morphine should be given with caution in older patients with cerebral arteriosclerosis, since it may cause irreversible depression of the respiratory center Many physicians believe that atropine given in combination with morphine largely counteracts the opiate s depressing effect on the respiration and also helps relieve the pulmonary edema Nalline is the antidote of choice for an overdosage of morphine In many older patients chloral hydrate is all that is needed to allay anxiety, small doses of barbiturates are sometimes useful *but occasionally* they may actually increase restlessness in this age group The administration of oxygen by catheter, tent or mask is of frequent benefit Aminophylline given intravenously is frequently effective in controlling bronchospasm and ameliorating the acute phase of edema Often a mercurial diuretic given parenterally is dramatically beneficial

Rapid digitalization with a quick acting glycoside given intra-

difficulty of diagnosis Only three of the group presented this classical picture, in the remaining patients the presenting complaints were major psychoses (3 cases) and gastrointestinal difficulty, renal insufficiency, wasting without fever during a six-week period of observation, and cerebral apoplexy (1 case each) All ten of these patients did have one common finding, *a heart murmur* The diagnosis of subacute bacterial endocarditis should be suspected in any adult with an organic heart murmur and unexplained fever of 101 F or above for more than one week (Friedberg 1956)

Whenever the possibility of subacute bacterial endocarditis is suspected, *multiple blood cultures should be taken promptly* and therapy instituted at once Bacteriologic cures can be achieved in some 70 to 80 per cent of the cases Prompter treatment *should* effect further improvement in both the morbidity and the mortality rates Relapses later than one month after termination of the treatment are unusual Despite a bacteriologic cure, endocarditis may lead to congestive failure, embolic phenomena, and renal insufficiency.

CONGESTIVE HEART FAILURE AND CARDIAC ARRHYTHMIAS

Congestive heart failure is present when the heart is physiologically unable to deliver the body's requirements for oxygen and nourishment The pathologic physiology of *high output failure* as contrasted with low output failure will not be discussed here

Etiologic Factors in Congestive Failure

Cardiac decompensation without an obvious underlying cause is rarely encountered in the elderly patient Some of the conditions that often precipitate congestive heart failure, or contribute to it, are arteriosclerotic heart disease, hypertensive heart disease primary pulmonary disease with cor pulmonale, hyperthyroidism rheumatic heart disease, bacterial endocarditis severe anemia and infrequently *congenital heart disease*

In the occasional case where no etiologic factor is evident, certain *uncommon conditions should be considered in the differential* diagnosis Occasionally, one of the collagen disorders may involve the heart Bickman (1956) *has reported cases of periarteritis*

ments of the dependent parts particularly the lower extremities are helpful in the prevention of thrombophlebitis

The success or failure of the therapeutic regimen may be dependent on strict adherence to a low salt intake Too often one sees patients "requiring" frequent parenteral doses of mercurial diuretics because they have not received adequate instruction as to what constitutes sodium restriction

Maintenance of digitalization is mandatory in chronic failure however in conditions such as thyrotoxicosis myocarditis constrictive pericarditis anemia certain avitaminoses and arteriovenous fistulas it is of little or no benefit When there is marked aortic or mitral stenosis surgical correction of the obstruction is necessary in order to achieve maximal benefit These and other conditions should be suspected whenever failure is unresponsive to the usual therapeutic measures

Periodic diuresis is frequently necessary in the management of chronic failure In our opinion mercurials remain the diuretics of choice for severe failure Diuril (chlorothiazide) in daily doses of 2 Gm is almost as effective as Mercuhydrin and has the advantage that it can be administered orally It is particularly useful in smaller dosages (0 5 to 1 Gm daily) for long term management Failure resistant to most diuretics will often respond to aminophylline followed by Mercuhydrin given intravenously In our experience the use of Mictine Rolicton, or Diamox alone is effective only in patients with mild failure

Before any diuretic therapy is begun renal insufficiency should be excluded One should be particularly alert for signs of the low salt syndrome or hypochloremic acidosis Frequent diuresis even in patients with normal kidney function often causes chloride and sodium ions to be excreted in excess of water resulting in hypochloremia hyponatremia or both. This electrolyte imbalance may be suspected if the patient has rapid shallow respirations with nausea vomiting exhaustion and lethargy and if his edema becomes refractory to diuretic agents Oral doses of ammonium chloride may be necessary to maintain the serum chlorides at a level sufficient for therapeutic response to mercurial diuretics or Diuril Ammonium chloride and other acidifying salts frequently have a potentiating effect on the subsequent mercurial injection

venously is mandatory in the acute phase of congestive heart failure, unless the patient has been taking a digitalis preparation. After the full therapeutic effect has been achieved, daily maintenance doses with a longer-acting preparation should be instituted. A cardiac arrhythmia, such as atrial fibrillation with a rapid ventricular rate, is frequently a factor in the precipitation of congestive failure. In such cases digitalization, while it usually will not alter the arrhythmia itself, will help to slow the ventricular rate.

If pulmonary edema persists despite these therapeutic measures and if the patient's hemoglobin level is satisfactory, a 'bloodless phlebotomy' should be performed by means of tourniquets applied to three extremities tightly enough to occlude only the venous drainage. The tourniquets should be rotated clockwise every 15 to 20 minutes. This measure, by reducing the venous return to the heart, diminishes the pulmonary cardiac output and frequently decreases the pulmonary congestion. If the bloodless phlebotomy produces improvement but does not end the attack of congestive failure, a surgical phlebotomy may be performed, the blood being collected in a sterile vacuum bottle for possible subsequent readministration to the patient. If the tourniquets produce no improvement, however, phlebotomy itself will be disappointing therapeutically.

If cardiogenic shock is present in addition to acute congestive failure, one of the vasopressor substances may be lifesaving. Phlebotomy is, of course, contraindicated in the presence of shock.

Sodium restriction is mandatory in the treatment of cardiac decompensation. If feasible, a diet containing no more than 200 mg of sodium should be instituted, and drugs containing sodium should be excluded. The restriction of sodium-free liquids does not seem justifiable.

Chronic Failure

When, despite these measures, there persists either pulmonary or systemic edema or both, the patient is in chronic congestive heart failure. In such cases rest, or at least restriction of activity, is beneficial, the degree of restriction depending on the severity of the failure. If the patient is confined to bed, active and passive move-

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function is especially rewarding in patients with hyperthyroidism, which may have been previously unsuspected

Experience has proved that most mild to moderate congestive heart failure can be adequately controlled with rigid sodium restriction restricted physical activity, adequate digitalization, and the judicious administration of diuretics Only in very severe cases will more drastic measures have to be attempted Management of the elderly patient with congestive failure, however, requires certain special considerations (1) Widespread coronary artery disease and fibrotic areas resulting from previous coronary occlusions functionally impair the heart action and may thwart therapeutic efforts (2) Electrolyte disturbances and hypoproteinemia secondary to chronic renal or hepatic involvement are more common in aged patients (3) Elderly patients with chronic congestive failure have a decreased cerebral flow and often cerebral hypoxia, sometimes resulting in bizarre, irrational behavior necessitating special management and diplomatic handling by the physician Consideration of these aspects of management is essential

Cardiac Arrhythmias

In the elderly patient, congestive heart failure is commonly precipitated or aggravated by cardiac arrhythmia Certain basic principles concerning the management of arrhythmias in this age group should be emphasized Aside from extrasystoles, atrial fibrillation is the most common problem Conversion of this irregularity to a sinus rhythm is desirable, and can be achieved in 55 to 70 per cent of the patients (Sawyer, *et al*, 1958) by the administration of quinidine Continuous quinidine maintenance therapy is necessary following conversion Despite this, some patients will revert to atrial fibrillation In such cases, quinidine should be discontinued

Contrary to the advice of many, we have always digitalized the patient with congestive failure, *chronic or impending* before attempting to alter his atrial fibrillation No adverse results have been detected from the simultaneous *administration of* digitalis and quinidine

The patient with atrial flutter should be fully digitalized If atrial fibrillation occurs after digitalization, the drug should be discontinued and often conversion to sinus rhythm will occur If

Hypoproteinemia may also be a factor contributing to the refractory nature of some cases of congestive failure It is rarely necessary to administer hypertonic saline or albumin intravenously in order to restore the electrolyte or colloid balance When *marked hypochloremia and hyponatremia occur during the course of chronic* congestive failure the prognosis is almost always poor

If the patient is eating well symptoms due to potassium deficit are unusual *There is frequently a gradual loss of potassium* however with chronic congestive failure Further loss of potassium occurs when a vigorous diuretic program is instituted Unfortunately this cellular depletion of potassium is often not accurately reflected by the serum potassium level which may be normal If a deficit is present replacement is essential This is done preferably by the oral administration of potassium although the drug may be given intravenously if caution is observed Since patients with *failure handle potassium poorly in terms of both storage and excretion* the possible danger in employing the intravenous route is potassium intoxication *Another serious difficulty* that accompanies potassium depletion is increased sensitivity to the toxic properties of digitalis serious arrhythmias are common

Chronic congestive heart failure is often associated with collections of fluid in the pleural cavity and this possibility should always be suspected in the dyspneic individual When a pleural effusion is present the removal of 500 to 1 000 cc of fluid from a pleural space will materially improve *the patient's comfort* and breathing ability Although diuretics are useful in the management *of ascites they are inadequate when used alone for the management* of a large pleural effusion

It is unwise to use potent hypotensive agents in the elderly patient with arteriosclerotic narrowing of the cerebral vessels A marked reduction in blood pressure will decrease the cerebral blood flow and may cause deleterious central effects If hypertension seems to be contributing to the congestive heart failure milder hypotensive agents such as *the Rauwolfia alkaloid derivatives may be utilized*

As Blumgart and his co workers (1955) have emphasized thyroidectomy or inhibition of thyroid function with radioactive iodine reduces the body's metabolic rate and may improve refractory chronic heart failure of long standing The inhibition of thyroid

function is especially rewarding in patients with hyperthyroidism, which may have been previously unsuspected

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flutter persists quinidine should be given to the limit of *tolerance* while the patient is still fully digitalized at *times neither measure* is effective in converting atrial flutter *In such instances one should* attempt to keep the individual fully digitalized *in order to control* the ventricular rate

Paroxysmal atrial tachycardia is usually not associated with organic heart disease and the majority of older patients with this type of arrhythmia will give a history of such episodes dating back a number of years The diagnosis should be confirmed electrocardiographically Among the measures that are effective in terminating this irregularity are unilateral carotid massage or ocular compression sedation rapid digitalization quinidine Prostigmin and Mecholyl

Nodal tachycardia is rare and is usually associated with significant organic disease It should be managed by measures similar to those used for paroxysmal atrial tachycardia but it is more difficult to revert

Ventricular tachycardia is most commonly associated with arteriosclerotic heart disease Unless this arrhythmia is identified early and treated promptly death usually ensues Both Pronestyl and quinidine are effective agents Digitalis glycosides are definitely contraindicated in patients with this irregularity since they are believed to increase ventricular irritability

Elderly patients often have a slow sinus rhythm even in the presence of congestive failure If complete or partial heart block is present digitalis still may be used when needed however when a conduction disturbance develops in a person who has been receiving digitalis one must suspect overdigitalization In the patient with a conduction disturbance the administration of quinidine is hazardous

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CHAPTER 15

Diseases of the Blood Vessels

HAROLD D GREEN

The principal diseases of the arteries are vasospastic conditions (Raynaud's phenomenon), obliterative diseases (thromboangiitis obliterans and atherosclerosis), embolic phenomena, and arteritis The principal diseases associated with the veins are varicosities, thrombophlebitis, and stasis ulceration and pigmentation

DISEASES OF THE ARTERIES

Vasospastic Diseases

Vasospastic diseases are much more common in the period between adolescence and middle age, and are almost never seen as primary phenomena in the aged Raynaud's phenomenon, however, may accompany the obliterative diseases of the aged

Diagnosis

SYMPTOMS Symptoms suggestive of arterial vasospasm are attacks of coldness, particularly in the toes and fingers and associated aching referred to the distal portions of the extremities Blanching of digits most often those on the ulnar side—may occur with or without associated coldness Cyanosis may be prominent and may precede or follow blanching These symptoms usually occur upon sudden exposure to cold, and usually are relieved promptly when the patient returns to a warmer environment The symptoms may disappear entirely in the summer

SIGNS *Physical* examination usually does not reveal much of interest unless one happens to see the patient during an attack

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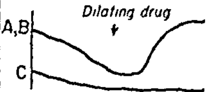
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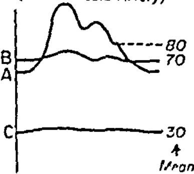
FIG 15 1 *Physiologic effects of arterial disease* (*Left*) Sites of segmental occlusions A None *B* In popliteal artery *C* In distal tibial artery

(*Center*) Walking time on a treadmill A Patients with normal circulation have no claudication *B* Patients with *segmental occlusions of the popliteal artery* usually have insufficient blood supply to the gastrocnemius muscle and therefore have intermittent *claudication in the calf after walking one to three minutes* *C* Patients with distal occlusions may have adequate circulation to the calf muscles and therefore have no claudication

(*Right upper*) Temperatures of toes before and after the administration of 120 cc (4 ounces) of alcohol by mouth *A* Normal response There is cooling of the toes (*vasoconstriction with reduced blood flow*) during the preliminary period of exposure to cool rapidly circulating air *warming* of the toes (vasodilatation with marked *increase in blood flow*) *occurs after the administration of alcohol and* warming of the torso *B* The response of patients with proximal segmental occlusions after the development of *adequate collateral circulation is the same* as the response of patients with *normal* circulation *C* In patients with distal arterial occlusions the absence of a vasodilator response indicates *inadequate* blood flow (This pattern is also seen in patients with proximal segmental occlusions immediately after arterial obstruction occurs)

(*Right lower*) Arterial pressure (and pulsations) in the dorsalis pedis artery *A* In *the normal* person *the* artery *pulsates and* has an adequate mean pressure (80 mm of mercury) in the horizontal position *B* After the development of collateral circulation *about the site of a proximal* occlusion pulsations may be absent (damped out), but the mean pressure may be adequate (70 mm of *mercury*) *C* In the patient with a *distal occlusion* (and in patients with recent proximal occlusions) pulsations are absent and the mean pressure is too low (30 mm of mercury) to supply adequate blood to the *foot*


Relative
Temperature Curves
Dilating drug
A,B
C


Comparison of
Pulse Pressures
(Dorsal Pedis Artery)
B
A
C
80
70
30
Mean

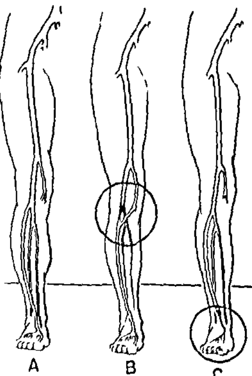
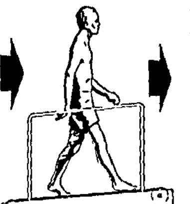
A
Normal
B
Occlusion
of muscular
circulation,
collaterals
supply skin
C
Occlusion
of cutaneous
circulation
Controlled, inclined
walking exercise
A and C — 5 minutes,
B — 1 minute

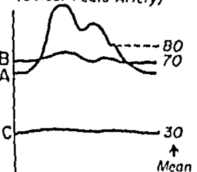
Fig. 15-1 Physiologic effects of arterial disease (*Left*) Sites of segmental occlusions *A* None *B* In popliteal artery *C* In distal tibial artery

(*Center*) Walking time on a treadmill *A* Patients with normal circulation have no claudication *B* Patients with segmental occlusions of the popliteal artery usually have insufficient blood supply to the gastrocnemius muscle and therefore have intermittent *claudication in the calf after walking one to three minutes* *C* Patients with distal occlusions may have adequate circulation to the calf muscles and therefore have no claudication

(*Right upper*) Temperatures of toes before and after the administration of 120 cc (4 ounces) of alcohol by mouth *A* Normal response There is cooling of the toes (*vasoconstriction with reduced blood flow*) during the preliminary period of exposure to cool rapidly circulating air Warming of the toes (vasodilatation with marked increase *in blood flow*) *occurs after the administration of* alcohol and warming of the torso *B* The response of patients with proximal segmental occlusions after the development of adequate collateral circulation is the same as the response of patients with normal circulation *C* In patients with distal arterial occlusions the absence of a vasodilator response indicates inadequate blood flow (This pattern is also seen in patients with proximal segmental occlusions immediately after arterial obstruction occurs)

(*Right lower*) Arterial pressure (and pulsations) in the dorsalis pedis artery *A* In *the normal person the artery pulsates and has an adequate mean pressure (80 mm of* mercury) in the horizontal position *B* After the development of collateral circulation *about the site of a proximal occlusion* pulsations may be absent (damped out), but the mean pressure may be adequate (70 mm of mercury) *C* In the patient with a *distal occlusion (and in patients with recent proximal occlusions)* pulsations are absent and the mean pressure is too low (30 mm of mercury) to supply adequate blood to the foot


A
Normal
B
Occlusion of muscular circulation, collaterals supply skin
C
Occlusion of cutaneous circulation
Controlled, inclined walking exercise
A and C — 5 minutes,
B — 1 minute
Relative Temperature Curves
Dilating drug
A,B
C
Comparison of Pulse Pressures
(Dorsal Pedis Artery)
B
A
C
80
70
30
Mean

obtain a normal rise (Fig 15 1A) in patients whose peripheral pulses are present is strongly suggestive of a severe degree of vasospasm

The vasospastic conditions are not associated with any characteristic changes in either the cellular elements or the chemical components of the blood

Treatment

Successful treatment of the vasospastic conditions depends primarily upon avoiding exposure to cold The patient should be cautioned to avoid contact with cold objects and should be instructed to dress more warmly than is comfortable when he goes outdoors in cold weather wearing warm loose fitting gloves heavy socks under loose fitting shoes and galoshes over his shoes on cold damp days whenever possible he should have his car warm before entering it for a prolonged trip

Drugs are moderately helpful Those that appear to be most effective include Ilidar which can be given in doses of 25 to 50 (occasionally 75) mg before meals and at bedtime Priscoline which can be given on the same schedule in doses of 25 to 50 mg and Arlidin which can be given four times a day in doses of 6 to 12 mg When *none of these* drugs alone is effective a combination of Ilidar (25 *to* 50 mg) before meals and Arlidin (6 to 12 mg) after meals may sometimes relieve the patient s *symptoms*

Any vasodilator drug may induce postural hypotension a condition particularly undesirable in elderly patients because of the possibility of a coronary *or* cerebral thrombosis The patient should always be instructed to begin with the minimal dose increasing it gradually as necessary over a period of several days to lie down at the slightest sign of weakness dizziness or nausea and if any of these symptoms occur to reduce the subsequent doses He should be cautioned never to increase the dose after such symptoms have appeared even though the tolerated dosage *is only partially* effective in relieving his vasospastic phenomena

In about 2 per cent of patients Ilidar induces a drug reaction characterized by chills aching, fever and gastrointestinal distress Characteristically this develops after the patient has been taking the drug for one to two weeks The patient should be warned of this possibility and should be told to discontinue the drug promptly

Unless obliterative disease is present simultaneously, the pulses are present and adequate, because of decreased amplitude, however, they may be somewhat difficult to feel during an attack Impaired nail growth or superficial ulcerations are sometimes present, but are more characteristic of obliterative disease Mild scleroderma—tightness of the skin, loss of the normal ridges, and tapering of the digits—may be present, but is rare in the aged

In the dependent position the fingers and toes usually retain their normal pink color, though they may become cyanotic When the limbs are elevated, the color may vary from moderately blanched to pale pink, the complete whiteness characteristic of obliterative disease is almost never seen except during an attack When the extremities are returned to heart level, 15 seconds may elapse before color begins to appear in the upper extremity, and up to 30 seconds before it returns to the lower extremity, only rarely, however, is a longer time required In the normal person return of color to the upper extremity begins within 5 seconds and is complete within 10 seconds, in the lower extremity it begins within 10 seconds and is complete within 15 seconds

Special Tests A better estimate of the presence and severity of vasospasm may be obtained from direct measurement of the circulation in the laboratory, either by plethysmography or by registration of skin temperatures The latter test can be carried out by placing the patient in a room maintained at a constant temperature of about 20° C (68° F) with a fairly rapid rate of air circulation In most persons, exposure to this environment will induce a certain amount of vasospasm and an accompanying drop in skin temperature The torso is then covered with blankets and warmed with electric pads or some other form of heat In most normal individuals warming of the torso will induce reflex relaxation of the vasospasm in the upper extremities, and may relax the vasospasm in the lower extremities If the temperature in the fingers and toes does not rise promptly to 30° C (86° F) or above, it is advisable to give some vasodilator Sixty cubic centimeters (2 ounces) of 100 proof whisky, repeated in 30 minutes, is effective and causes fewer side effects, such as postural hypotension, than most other drugs In all persons with normal circulation the administration of whisky causes a prompt rise in the temperatures of the fingers, and usually in the temperatures of the toes Failure to

obtain a normal rise (Fig 15 1A) in patients whose peripheral pulses are present is strongly suggestive of a severe degree of vasospasm

The vasospastic conditions are not associated with any characteristic changes in either the cellular elements or the chemical components of the blood

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if such an attack occurs If the physician wishes to be certain that such an attack was due to drug sensitivity, he may instruct the patient to take one tablet and wait 24 hours If the patient has acquired a sensitivity to the drug, a mild repetition of the attack will always occur during this period

Ganglionic blocking drugs have not proved to be very effective In extremely severe vasospastic conditions that cannot be relieved by any of the vasodilator drugs, it may occasionally be necessary to resort to sympathectomy Amputation is almost never necessary

Obliterative Disease and Embolic Phenomena

The two principal causes of obliterative disease are thromboangiitis obliterans (Buerger's disease) and atherosclerosis Thromboangiitis obliterans is an inflammatory condition involving all coats of the arteries in both upper and lower extremities, and sometimes extending to the accompanying veins and nerves It may begin in adolescence, and the peak incidence occurs in young adults It is almost never seen as a primary disease in persons over 50, although a patient with thromboangiitis obliterans may live into the geriatric age group The cause is unknown, although there is a definite relationship to smoking at least 99 per cent of patients with thromboangiitis obliterans are smokers The condition is almost entirely limited to the male

Atherosclerosis, one of the forms of arteriosclerosis is characterized by lipoid deposits in the intima of the arteries The lipoid may occur anywhere in the aorta or its distributing arteries It is much more common in the region of the arch and in the region below the mesenteric arteries than in the mid-portion of the aorta The disease rarely produces symptoms involving the upper extremities, and its manifestations are usually limited to the cerebral and coronary arteries and to the arteries of the lower extremities

Instances of atherosclerosis have been reported in childhood but usually it does not begin to cause symptoms until the age of 40 the peak incidence is reached between 60 and 80 Thus in contrast to thromboangiitis obliterans, it is a geriatric disease Atherosclerosis is rare in nonhypertensive women prior to the menopause Following the menopause, the incidence becomes equal in the two sexes Although the lipoid deposits tend to narrow the lumen, symptoms

are usually produced by the tendency for the intima to become roughened allowing a superimposed thrombosis that completely occludes the artery The thrombus is usually segmental in type and extends over only a few centimeters of the vessel The mechanism producing obstruction is identical in atherosclerosis and thromboangiitis obliterans in both conditions the vascular insufficiency is due to occlusion of the lumen by thrombosis In both conditions improvement normally depends solely upon the development of collateral circulation about the site of the segmental occlusion

In patients with diabetes atherosclerosis tends to occur some 10 to 20 years earlier and some 10 to 20 times more frequently than in nondiabetic individuals Although the atherosclerotic process may occur at any point it has been my impression that in the presence of diabetes the disease is more likely to involve the smaller, more distal arteries of the feet so that diabetic patients are more likely to have cutaneous manifestations rather than claudication

No clear cut relationship between smoking and the development of atherosclerosis has been demonstrated Atherosclerotic complications appear to be more frequent in patients whose parents had atherosclerotic disease and in the "well nourished" patient whose dietary intake is heavy in fats *Hypertension* appears to be associated with a higher incidence of cerebral and coronary atherosclerosis the association of hypertension with atherosclerosis in the lower extremities is less clear cut In most patients with atherosclerosis the serum cholesterol is elevated to 300 mg per 100 cc or above

Cases have been reported in which a segmental occlusion developed in the tibial or popliteal artery following a faulty step or sitting for a prolonged period with the knee hyperextended Segmental occlusion of the brachial artery has been noted in individuals who have used a crutch Such findings suggest that trauma may be a contributing factor in the development of the atherosclerotic lesion

Embolic occlusion of an artery most commonly accompanies atrial fibrillation The embolus tends to lodge at a bifurcation of the vessel where the channel suddenly becomes narrowed In some cases where embolic occlusions have occurred in the upper extremity it has been thought that a thrombus arising at a higher point in the artery for instance at the site of a cervical rib—may

have become dislodged, resulting in an embolus at the site of the profunda branch of the brachial artery

Diagnosis

SYMPTOMS The symptoms produced by thromboangiitis obliterans, atherosclerosis, and embolic phenomena are similar In all these conditions, the onset of symptoms is often sudden, corresponding to the occlusion of a cerebral artery (stroke) or of a coronary artery (heart attack) Obstruction occurring at the site of the lower aorta or common iliac arteries is usually accompanied by aching referred to the region of the pelvic girdle, to the greater trochanters, and to the upper thighs Symptoms are brought on by stooping, lifting, or walking, and particularly by walking upstairs or uphill Initially there may be mild claudication referred to the calf, or symptoms of coldness and blanching in the foot, but these usually disappear rapidly as a result of the fairly prompt development of collateral circulation about the site of the obstruction Inability to have an erection often accompanies lower aortic thrombosis

Segmental occlusion involving the femoral artery system most commonly occurs in the region of the adductor canal or the popliteal space When the occlusion occurs suddenly, it may induce severe pain, aching, coldness, and blanching referred to the foot, ankle, and lower leg, the aching in the foot, lower leg and calf may be aggravated by walking The symptoms referable to the foot may gradually disappear, leaving as the only residual symptom the persistence of calf pain (intermittent claudication) on walking, even this symptom may lessen with time

Occlusions limited to the lower portions of the anterior or posterior tibial arteries, or of both may give rise to blanching, coldness, and aching in the foot and toes with aggravation of the pain referred to the region of the heads of the metatarsals on prolonged standing or squatting Depending on his powers of observation, the patient may or may not notice redness of the foot when it is dependent With occlusions limited to this area, calf pain on walking or pain referred to the hips and thighs is usually absent Ulceration may be seen with occlusions higher in the arterial tree, but is usually present only with occlusions involving the distal portions of the tibial arteries

Segmental occlusions in the upper arm have been limited usually to the brachial artery at the site of the profunda They are usually accompanied by marked coldness blanching and aching referred to the whole arm but particularly to the hand. The aching in the hand and forearm is aggravated when the patient attempts to use the extremity

It has been stated that nocturnal cramps and pain in the thighs or calves are rarely signs of vascular disease However, such symptoms often precede or even accompany occlusive vascular disease and are most likely to occur in patients with this condition after prolonged and excessive use of the extremities during the daytime When such pain is accompanied by an actual prolonged contraction or cramp in the muscle, it is more suggestive of hyperirritability of motor nerves in the cord than of vascular disease

SIGNS In the presence of segmental occlusion involving the lower aorta all pulses are absent in both extremities When the common iliac artery alone is involved all pulses in that extremity are absent but the pulses in the opposite leg are usually normal The presence of a femoral pulse in an extremity with absent *popliteal dorsalis* pedis and posterior tibial pulsations usually signifies a segmental occlusion involving the femoral artery in the adductor canal or popliteal space (*Fig 15-1B*) Correspondingly, the presence of femoral and popliteal pulses with absence of pulsations in the dorsalis pedis or posterior tibial *arteries or in* both, *indicates* segmental occlusions involving the more distal arteries in the lower leg (Fig 15-1C)

Adequacy of the circulation to the feet can best be estimated from the color changes The patient should first be asked to sit with the feet dangling over the edge of the examining table for at least 3 minutes If the toes become an unusually deep red the patient has dependent rubor This sign invariably signifies a prolonged ischemia of the skin of the foot owing either to a recent proximal segmental occlusion or to a recent or previous distal segmental occlusion involving the tibial arteries

The subject should next be examined lying down, with the feet elevated as high as possible for 30 seconds, during part of this time the patient should be instructed to *move* his toes In patients with adequate circulation the feet may become pale pink while they are elevated but rarely assume the lemon white color characteristic of

have become dislodged, resulting in an embolus at the site of the profunda branch of the brachial artery

Diagnosis

SYMPTOMS The symptoms produced by thromboangiitis obliterans, atherosclerosis, and embolic phenomena are similar In all these conditions, the onset of symptoms is often sudden, corresponding to the occlusion of a cerebral artery (stroke) or of a coronary artery (heart attack) Obstruction occurring at the site of the lower aorta or common iliac arteries is usually accompanied by aching referred to the region of the pelvic girdle, to the greater trochanters, and to the upper thighs Symptoms are brought on by stooping lifting, or walking, and particularly by walking upstairs or uphill Initially there may be mild claudication referred to the calf, or symptoms of coldness and blanching in the foot, but these usually disappear rapidly as a result of the fairly prompt development of collateral circulation about the site of the obstruction Inability to have an erection often accompanies lower aortic thrombosis

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severe obliterative disease If the foot has shown marked dependent rubor, there is likely to be considerable ecchymosis represented by an orange-pink color This pigmentation is most readily observed while the foot is elevated, and does not disappear upon pressure

At the end of 30 seconds the feet are brought down to heart level and observed for return of color Normally, as was indicated in the section on vasospastic diseases, color should begin to return in less than 10 seconds and be complete in 15 seconds, filling of the veins should be noted in 15 to 30 seconds In the presence of a recent segmental occlusion involving any portion of the femoral arterial tree, 2 to 4 minutes will usually elapse before color begins to return *In patients with more proximal segmental occlusions,* the time required for return of color may be progressively shortened as collateral circulation develops Prolonged delay in the return of color is most often seen with distal segmental occlusions involving the tibial arteries

The degree of intermittent claudication can be estimated to some extent from the patient's history In addition, however, it is wise to use some objective measure, such as having the patient walk in the hospital or in the examining office, preferably upstairs I use *a treadmill operated at about a 6 per cent slope and adjusted* to require walking at a fairly rapid gait (approximately 2 2 miles per hour), at this rate the normal individual can walk more than 5 minutes without difficulty (Fig 15 1*A*), patients with occlusions at or above the popliteal space may have severe discomfort within one minute (Fig 15-1*B*) As the collateral circulation to the calf muscles improves, such patients may be able to increase their walking time progressively, *though it rarely exceeds three minutes*

Special Tests Except for a moderate elevation of the serum *cholesterol in the presence of atherosclerosis and elevation* of blood sugar in patients with diabetes, there are no characteristic changes in the chemical composition or cellular elements of the blood

An objective measure of the circulation to the feet may be made by means of temperature studies such as those described in the section on vasospastic diseases In the presence of severe obliterative disease the temperatures of the toes drop with unusual rapidity during the initial period of cooling, and actually approach room temperature, they fail to show any rise in temperatures following

the administration of a vasodilator substance and do not rise to any significant degree following direct blockade of the lumbar sympathetic nerve with procaine (Novocain) When the toe temperatures of a subject exposed to a room temperature of 20° C (68° F) remains around 21 to 22° C (70 to 72° F) following the administration of adequate vasodilators one may assume that the patient has a severe obliterative condition with a minimal blood supply to the toes (Fig 15-1C) During the months following the segmental occlusion the toe temperatures often rise to 24° to 27° C (75° to 79° F) indicating the development of moderate collateral circulation to the foot A rise in the toe temperatures during vasodilatation to 31° to 33° C (88° to 91 5° F) indicates either the presence of a completely normal circulation to the foot or the development of a completely adequate collateral circulation Persistent intermittent claudication in the calf muscles is not uncommon however even after the collateral circulation has developed to a point where the skin temperature of the toes shows a normal response and physical examination of the feet reveals no dependent rubor or increased time for return of color when the feet are lowered to heart level after a period of elevation (Fig 15-1B)

Therapy

The therapy of the occlusive diseases particularly during the first few months following the occlusion consists primarily in taking great care to protect the skin of the feet from any trauma that might lead to ulceration since it is highly probable that an ulcer developing at this time would not heal When the occlusion is in a more proximal artery this danger becomes lessened as collateral circulation develops With the more distal occlusions however this danger persists for prolonged periods of time

The patient should be instructed to wear loose comfortable shoes so adjusted that they do *not* rub The feet should be washed frequently and dried by patting rather *than* rubbing Fung [illegible] tions between the [illegible] that might be [illegible] be removed ar [illegible] unusually careful in walking about unfamiliar sites so as to avoid falling or striking his foot A foot board should be used in bed to hold the covers up off the toes

The patient should be cautioned against lying for a long time in any one position, if he finds it difficult to avoid doing so, a U shaped pad of rubber 2 inches thick should be used to support the weight of the foot on the Achilles tendon The purpose of this is to prevent prolonged contact of the posterolateral aspect of the heel with the bed, since this often leads to decubitus ulcerations in such patients

Patients with occlusive disease limited to the tibial arteries frequently note that the pain in the foot that occurs at rest tends to be aggravated at night, when the foot is elevated to heart level Such patients may obtain relief by letting the foot hang over the edge of the bed and rest on a padded stool, or by elevating the head of the bed 4 to 6 inches Unfortunately, such procedures frequently lead to the development of moderate edema in the involved foot

Care should be taken to avoid exposure of the feet to undue cold since any degree of reflex vasoconstriction is likely to aggravate the condition, leading to increased pain and furthering the tendency to ulceration Hot soaks and compresses, on the other hand, should also be avoided, since they tend to create a relative ischemia by increasing tissue metabolism more than the blood flow A neutral temperature is preferable

The patient should be given one of the vasodilator drugs mentioned in the section on vasospastic conditions even though it may appear initially to be accomplishing no good The prolonged use of vasodilators appears to stimulate more rapid development of collateral circulation, particularly in the more proximal segmental occlusions As in the vasospastic conditions however, such drugs must be given with caution in order to avoid postural hypotension, particularly in the aged

If the underlying condition is diagnosed as thromboangiitis obliterans, smoking should be avoided at all costs If atherosclerosis is the causative factor, however—and this is more likely if the condition has developed after the age of 50—we are less inclined to urge the patient to give up smoking, unless temperature studies demonstrate that the individual has a vasospastic response to the use of tobacco

The prolonged use of anticoagulants such as heparin or warfarin (Coumadin) may prove useful, particularly during the first month or two following an occlusion We attempt to keep the prothrombin

time at 25 seconds plus or minus 5 seconds with a control of 11 to 13 seconds This objective can usually be accomplished by giving the warfarin orally on the following schedule first day 50 mg second day 30 mg third day 20 mg thereafter 5 to 15 mg per day Elevation of the prothrombin time above 35 seconds is frequently accompanied by renal hemorrhage (indicated by dark smoky urine) and hemorrhage into or about a joint

Sympathectomy may be employed if there is any indication that a vasospastic component is present I usually reserve this operation however for the patient who is not able to tolerate fairly large doses of vasodilator drugs Like the vasodilator drugs sympathectomy speeds the development of collateral circulation about the site of a segmental occlusion I usually avoid amputation unless the pain resulting from ulceration becomes so intense that narcotics are required over a period of some weeks In such a situation prompt amputation should be recommended in order to minimize the dangers of addiction and also because severe pain experienced over a prolonged period may tend to increase the likelihood of the phantom limb syndrome following amputation

In the case of a sudden embolic occlusion of a vessel embolectomy should be attempted At the present time I seldom recommend procedures such as intimectomy or the substitution of homografts or artificial arterial grafts for the obstructed portion of the vessel In my experience such surgical attempts have frequently failed and even the successful grafts have rarely remained patent longer than one to three years However improvement of surgical techniques in this direction will occur and some clinics now claim a high percentage of success Such procedures are most apt to be successful in the Leriche syndrome (idiopathic thrombosis of the terminal aorta) or in segmental occlusions of the aorta or common iliac artery Even in the presence of these conditions I am inclined to be conservative as a result of my experience with a fairly large number of such patients who have been managed without surgery or with sympathectomy alone Most of these patients have been almost completely relieved of symptoms by the development of collateral circulation The only persistent symptom has been claudication pain referred to the pelvic girdle and this is seldom very troublesome In my experience neither proximal nor distal extension

of a lower aortic thrombosis has occurred with any significant frequency

All patients with arterial obliterative disease should be encouraged to walk as much as possible, up to the point of developing claudication pain Such walking operates in collaboration with the vasodilator drugs and sympathectomy to stimulate the development of collateral circulation about the site of the segmental occlusion

When diabetes is present, this condition should of course be controlled as well as possible In some cases ischemic neuritis is responsible for the persistence of paresthetic pains Attempts to treat these with the various B vitamins, thiamine, nicotinic acid, and B_{12} have been disappointing, except for an occasional response to thiamine

Prognosis

The prognosis following a segmental occlusion that involves one of the larger, more proximal arteries (the popliteal artery, the femoral artery in the adductor canal, the common iliac artery, or the lower aorta) is usually favorable Almost invariably good collateral circulation develops about the proximal segmental occlusions producing progressive improvement and often abolishing most of the patient's symptoms On the other hand, patients with occlusions involving the distal portions of the tibial arteries rarely improve, although they may remain in a fairly satisfactory static condition over periods of months and even years if trauma to the feet and the consequent painful, nonhealing ulcers can be avoided

Arteritis

Temporal or cranial arteritis a condition seen in old age is apparently a relatively localized and comparatively benign variant of polyarteritis nodosa It is characterized by fever, severe headaches swelling and tenderness of the temporal arteries, and leukocytosis The prognosis for life is good, but permanent or temporary blindness has been a complication in a large number of the reported cases

Cortisone or one of its modifications gives dramatic relief from symptoms, although it may not prevent involvement of the retinal vessels

DISEASES OF THE VEINS

Varicose Veins

When varicose veins are present without other complications, the patient may complain only of dilated, tortuous veins and some heaviness in the legs associated with prolonged standing. This condition is more common in women, but may occur in men; in the latter it is somewhat more frequent in the left than in the right extremity.

Mild cases may be treated by the use of an elastic stocking and elevation of the feet, but in more severe cases ligation and stripping of the dilated veins is probably the most satisfactory approach.

Acute Thrombophlebitis

Acute thrombophlebitis may occur at any age, and is especially frequent in elderly patients following a period of immobilization after surgery. The only symptom may be a painful area along the site of the vessel, or the patient may have swelling, pain, and cyanosis involving a portion of the leg or even the entire leg. Because of the swelling it may be difficult to detect the pulses, and in such cases differentiation of this condition from acute arterial occlusion is not easy. However, swelling rarely, if ever, accompanies acute arterial occlusion per se, and in this condition blanching is more common than cyanosis, unless there is accompanying venous disease. The acute localized areas of tenderness may be aggravated by maneuvers that stretch the affected vein. An example is Homans' sign: pain produced by dorsiflexion of the foot and referred to the lower portion of the gastrocnemius muscle, along the lesser saphenous vein.

Localized areas of migratory thrombophlebitis may occur in the elderly, although they are more frequent in younger patients. They are characterized by nodular, red, tender swellings, circular or linear in shape, that occur along the course of superficial veins. They last from a few days to a few weeks.

Acute thrombophlebitis rarely results in pulmonary embolism. In the form often designated as phlebothrombosis, however, poorly

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DISEASES OF THE VEINS

Varicose Veins

When varicose veins are present without other complications the patient may complain only of dilated tortuous veins and some heaviness in the legs associated with prolonged standing This condition is more common in women but may occur in men in the latter it is somewhat more frequent in the left than in the right extremity

Mild cases may be treated by the use of an elastic stocking and elevation of the feet but in more severe cases ligation and stripping of the dilated veins is probably the most satisfactory approach

Acute Thrombophlebitis

Acute thrombophlebitis may occur at any age and is especially frequent in elderly patients following a period of immobilization after surgery The only symptom may be a painful area along the site of the vessel or the patient may have swelling pain and cyanosis involving a portion of the leg or even the entire leg Because of the swelling it may be difficult to detect the pulses and in such cases differentiation of this condition from acute arterial occlusion is not easy However swelling rarely if ever accompanies acute arterial occlusion per se and in this condition blanching is more common than cyanosis unless there is accompanying venous disease The acute localized areas of tenderness may be aggravated by maneuvers that stretch the affected vein An example is Homans sign pain produced by dorsiflexion of the foot and referred to the lower portion of the gastrocnemius muscle along the lesser saphenous vein

Localized areas of migratory thrombophlebitis may occur in the elderly although they are more frequent in younger patients They are characterized by nodular red tender swellings circular or linear in shape that occur along the course of superficial veins They last from a few days to a few weeks

Acute thrombophlebitis rarely results in pulmonary embolism In the form often designated as phlebothrombosis however poorly

of a lower aortic thrombosis has occurred with any significant frequency

All patients with arterial obliterative disease should be encouraged to walk as much as possible, up to the point of developing claudication pain Such walking operates in collaboration with the vasodilator drugs and sympathectomy to stimulate the development of collateral circulation about the site of the segmental occlusion

When diabetes is present, this condition should of course be controlled as well as possible In some cases ischemic neuritis is responsible for the persistence of paresthetic pains Attempts to treat these with the various B vitamins, thiamine, nicotinic acid, and B_1 have been disappointing, except for an occasional response to thiamine

Prognosis

The prognosis following a segmental occlusion that involves one of the larger, more proximal arteries (the popliteal artery, the femoral artery in the adductor canal, the common iliac artery, or the lower aorta) is usually favorable Almost invariably good collateral circulation develops about the proximal segmental occlusions, producing progressive improvement and often abolishing most of the patient's symptoms On the other hand, patients with occlusions involving the distal portions of the tibial arteries rarely improve, although they may remain in a fairly satisfactory static condition over periods of months and even years if trauma to the feet and the consequent painful, nonhealing ulcers can be avoided

Arteritis

Temporal or cranial arteritis, a condition seen in old age, is apparently a relatively localized and comparatively benign variant of polyarteritis nodosa It is characterized by fever severe headaches, swelling and tenderness of the temporal arteries, and leukocytosis The prognosis for life is good but permanent or temporary blindness has been a complication in a large number of the reported cases

Cortisone or one of its modifications gives dramatic relief from symptoms, although it may not prevent involvement of the retinal vessels

minimize the development of further stasis ulceration and pigmentation

MISCELLANEOUS CONDITIONS

Occasionally a patient may be seen with a marked deep pink coloration of the skin of the toes and fingers which may be mistaken for dependent rubor If the patient has no symptoms and if the pulses are present the condition probably represents simply erythema for which no therapy is necessary The patient should be reassured that he has no occlusive disease

Erythermalgia a condition in which pain in an extremity is often accompanied by a marked increase in the pink coloration of the skin is presumably due to or at least associated with excessive cutaneous blood flow This condition is rarely if ever, seen in geriatric patients

Various paresthesias—burning aching and cold sensations—may be seen in patients of all ages and may be due either to peripheral neuritis or to various cord lesions They may be suggestive of arterial or venous disease particularly the former Primary neural involvement should be suspected whenever the symptoms have a segmental distribution or one corresponding to that of a peripheral nerve and particularly when they are poorly localized and are not accompanied by tenderness or by objective signs such as loss of pulses discoloration delayed return of color after elevation ulceration or claudication

adherent thrombi form in the veins, these may become dislodged and cause a pulmonary embolus

Most cases of acute thrombophlebitis are best treated by bed rest, with elevation of the lower extremities above the level of the hip and local applications of moist heat. Vasodilator drugs should be given, and in some cases direct lumbar blockade may be advisable Elastic stockings or firm wrapping of the extremities should be used for a prolonged period after the acute process subsides and ambulation has begun The aching often responds to salicylates Anticoagulants, used as recommended in the section on obliterative diseases, are often helpful

Stasis ulceration and pigmentation are often sequelae of thrombophlebitis. They probably begin with transudation of blood from the capillaries, caused either by reflux of blood in the dilated superficial veins or by this factor plus some obstruction resulting from thrombosis in the deeper vessels With prolonged extravasation of blood the nourishment of the skin becomes impaired and ulceration frequently occurs The ulceration is characteristically limited to the region of the lower extremity proximal to the malleolus Ultimately, the skin may become thick and tightly adherent to the underlying tissue, and a permanent brown to black discoloration may develop

In the treatment of stasis ulceration and pigmentation, it is necessary to improve the venous return from the leg as much as possible In the presence of acute inflammation of the skin, frequently seen if there is any accompanying fungus infection of the toes, surgery must be postponed until the local inflammatory condition can be cleared up An ointment containing an antibiotic such as bacitracin may be applied to the ulcer, and potassium permanganate soaks (in a solution of 1 6,000 to 1 8,000) may be used in conjunction with a pressure bandage from the toes to just below the knee We use a 3-inch-wide Kling bandage wrapped firmly about the foot, ankle, and lower leg The healing process may often be accelerated by the simultaneous use of vasodilator drugs, but these should be used only when the patient can lie down with the affected leg elevated for one to two hours after the drug is administered It is also well to have the patient sleep on a bed with the footposts elevated 4 to 6 inches

As soon as the acute dermatitis has been alleviated, any varicose veins that can be found should be ligated and stripped in order to

minimize the development of further stasis ulceration and pigmentation

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CHAPTER 16

Pulmonary Diseases

H. O. SIEKER

In view of the recent emphasis on geriatric problems in all phases of medicine and related fields, it is remarkable that little is written or known about the aging lung (Richards, 1956) This paucity of information may be due in part to the relatively insignificant anatomic changes observed in the lungs of aged persons without associated diseases Moreover, the lungs apparently have enough reserve so that, in the absence of disease, aging of the pulmonary system does not limit the individual's activity In spite of these facts, pulmonary diseases are among the most important problems in geriatrics Before the era of antibiotics, pneumonia was the most common cause of death in elderly patients At the present time, obstructive emphysema and lung tumor are examples of pulmonary disease observed frequently in senescence

Both genetic and environmental factors play a role in the aging process In the lung it is difficult to separate the natural changes associated with aging from those produced by countless insults sustained from the environment In this discussion the anatomic changes and physiologic derangements of the aged lung can be considered only briefly The primary purpose of the chapter will be to examine the pulmonary diseases commonly seen in elderly patients, and to emphasize the manner in which senescence alters the clinical picture, contributes to the etiology, and modifies the management

ANATOMIC AND PHYSIOLOGIC CHANGES OF THE AGING LUNG

The upper respiratory tract, the entrance to the lung is exposed to more insults of environment than any other tissue of the body

Senescence is associated with atrophy of the nasal mucosa and glands, decreased ciliary activity, viscid secretions, and increased fibrous tissue in the submucosa In the pharynx and larynx, muscle weakness is present The trachea is widened, and the bronchi are slightly narrowed Atrophy of the mucosa and mucous glands is observed, most of which is probably caused by insult from the contaminated and "unphysiologic" air that courses through the tubes and from recurrent infections over the years

It is doubtful if any autopsy material shows only the normal changes of aging in the lung, but certain alterations may be ascribed chiefly to this process (Bickerman, 1952) The senile lung is decreased in size and weight, and is pale, gray, and flabby Histologically the alveoli are larger than those of young subjects, the walls are thin, and the elastic tissue is reduced The pleural surface is thin, opaque, dry, and lusterless All these changes probably represent dehydration and tissue wasting, with loss of elastic tissue in particular Almost as important as the changes in the lungs themselves are those in the chest wall and pulmonary vascular system The spine tends to be kyphotic, and motion of the rib cage is limited There is atrophy of the muscles and other superficial covering of the chest wall Intimal or medial changes in the smaller pulmonary arteries are reported to begin between the fifth and seventh decades (Welch and Kinney 1948)

A number of studies (Kaltreider, *et al*, 1938, Baldwin, *et al*, 1948, Greifenstein *et al*, 1952, Frank, *et al* 1957) have dealt with the alterations in pulmonary function observed with advancing age The [illegible]
in th [illegible]
is ob [illegible] the ratio of residual capacity to total capacity

TABLE 16-1 COMPARISON OF PULMONARY FUNCTION IN YOUNG AND OLDER ADULTS*
(Mean and Standard Deviation)

Age	*Vital capacity*	*Functional residual capacity*	*Efficiency of gas mixing*
28	4.8 L + 1.2	2.9 L ± 0.7	75% ± 12
53	3.5 L ± 1.2	3.5 L ± 0.9	54% ± 12

* Data from Bates and Christie 1955

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Age	*Vital capacity*	*Functional residual capacity*	*Efficiency of gas mixing*
28	4 8 L ± 1 2	2 9 L ± 0 [illegible]	75% ± 12
63	3 5 L ± 1 2	3 5 L ± 0 9	54% ± 12

* Data from Bates and Christie 1955

is slightly increased The maximal breathing capacity decreases slightly, but is remarkably good Intrapulmonary gas mixing is less adequate than in younger individuals (Table 16-1) The arterial oxygen saturation drops from 95 per cent at 20 years to 92 to 93 per cent at 70 years Arterial carbon dioxide tension is unchanged, or only slightly decreased

ACUTE PNEUMONIAS

Before the advent of chemotherapy, pneumonia was a very common illness in the older age group Termed the 'friend of the aged" it was often responsible for the death of patients with other chronic painful, and debilitating illnesses (Heffron, 1939) Although death from pneumonia is now much less common, Zeman and Wallach (1946) have reported a fatality rate of 20 per cent in elderly patients In a more recent survey by Rhoads (1956), however, there were only 2 deaths in 105 cases, of which half were in patients past middle age

A number of factors in the aged lung contribute to the relatively high incidence of pneumonia in elderly patients As has already been noted, it is difficult to separate the normal aging process from the changes induced by extrinsic factors through years of exposure The defenses against bacteria passing through the upper airway are weakened by the aging process In the tracheobronchial tree, ciliary activity is decreased, and the mucus secreted is often viscid and difficult to produce by coughing The cough reflex is diminished as a result of decreased muscle tone, lowered sensitivity to stimuli, and slowing of reflex activity

In addition, the mechanisms for protection against infection in general and pulmonary infection in particular are probably less efficient in older people (Perla and Marmorston, 1941) The capacity to produce antibodies is diminished, and the repair processes are impeded The older patient is often predisposed to pneumonia by the presence of other chronic conditions such as malnutrition avitaminosis, congestive heart failure, chronic pulmonary disease, cerebral vascular accidents, tumor, and liver disease Steroid therapy and inappropriate antibiotic therapy, as well as immobilization of the chest and bed rest itself, may also be responsible for decreased resistance to this type of infection

Three factors frequently responsible for the development of pneumonia in elderly patients should be emphasized because they can often be prevented Bacteria often enter the lungs by *aspiration*, which occurs most often during a period of altered consciousness such as that produced by sleep, a cerebral vascular accident, anesthesia, or drug intoxication In the presence of bronchial disease or immobilization of the chest, pneumonia develops in areas of *atelectasis* In the debilitated patient, *congestion and edema* in dependent portions of the lungs also provide a favorable site for infection

In the past the organism most frequently responsible for pneumonia has been the pneumococcus, and approximately one half of the cases reported in a recent series (Zeman and Wallach, 1946) were caused by this organism In the following discussion, the characteristics of the various types of pneumonia will be considered individually It should be recognized that the bacterial flora will often change during the course of the disease, and that several organisms may be present at the same time

Pneumococcal Pneumonia

The characteristic clinical picture of pneumococcal or lobar pneumonia—sudden onset with a shaking chill, pleuritic chest pain, cough, *rusty sputum* and fever—is familiar to most physicians While such a pattern of symptoms may occur in the *elderly* patient, it is more common for the course of the illness to be altered in old age The patient may experience general malaise fatigue, and irritability associated with coryza, over a period of several days to a week A moderate elevation of temperature and slight chilly sensations may be noted and a productive *cough* is often present. Symptoms of respiratory embarrassment such as cyanosis and dyspnea, are usually more prominent in the elderly patient, and gastrointestinal symptoms leading to marked prostration may also be noted

The earliest signs of lobar pneumonia are decreased vocal fremitus, questionable dullness on percussion, and decreased breath sounds over the involved area After 24 to 36 hours, the more obvious signs of consolidation appear increased vocal fremitus, dullness on percussion bronchial breathing, and whispered pectoriloquy Fine, crepitant inspiratory *rales* are noted initially, these be-

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be modified in elderly patients, just as the onset of pneumococcal pneumonia is modified Cough, purulent and blood streaked sputum, pleuritic chest pain, tachycardia, and tachypnea are characteristic features, and cyanosis may also be prominent Physical examination reveals scattered, fine inspiratory rales without the signs of frank lobar consolidation

The leukocyte count is usually higher than that associated with pneumococcal pneumonia. Large numbers of streptococci may be observed on sputum examination and in cultures The chest roentgenogram usually shows a patchy pneumonitis

The mortality rate from this infection is high, and the most frequent complication is empyema Streptococcal empyema, however, is often secondary to pneumonia caused by other organisms, or to infarcts or tumors of the lung The pleural fluid is serosanguineous, but becomes thick and purulent with time

Staphylococcal Pneumonia

Staphylococcal infections in general present an increasingly serious problem, particularly in the elderly patient who is debilitated by a chronic disease The problem has become even more alarming with the development of resistant staphylococci and the preponderance of these organisms in the hospital environment where the elderly patient is often committed for treatment of some other primary illness In addition, these patients often receive *treatment* with steroids nitrogen mustard, or other agents that alter host defense mechanisms

The onset of staphylococcal pneumonia is usually insidious and preceded by a chronic illness It is characterized by remittent fever, malaise anorexia, and cough productive of purulent sputum, which is characteristically bright yellow On physical examination, the patient appears extremely ill and many fine, medium, and coarse inspiratory and expiratory rales can be heard in the chest

Leukocytosis may be present, although a severe infection may be associated with a normal leukocyte count or even with leukopenia Many staphylococci can be seen in the Gram stain of the sputum, and sputum cultures confirm the diagnosis The chest roentgenogram shows scattered areas of pneumonitis, with multiple small abscesses

Complications of staphylococcal pneumonia are empyema and

come coarser and louder during the period of consolidation and resolution

Leukocytosis with an increase in the young polymorphonuclear leukocytes may be one of the laboratory findings As with any infection in older patients, however, the leukocytosis may be absent or minimal, with white cell counts below 15,000 Severe or fulminating disease may actually be associated with leukopenia Examination of the sputum reveals the lancet-shaped diplococci, which on inoculation into the mouse will cause death Sputum cultures and blood cultures should be obtained to identify the organisms and to detect the presence of bacteremia Routine typing of pneumococci is not practical and is no longer necessary Roentgenograms of the chest are useful in establishing the diagnosis and in locating the area of involvement when physical findings are difficult to interpret The process may extend through more than one lobe, or may not involve the lobe in its entirety

The most frequent complications of pneumococcal pneumonia are pleurisy and empyema Pleurisy with pleural effusion is very common, and empyema may develop in as many as 8 per cent of the cases, especially if treatment is delayed The empyema fluid, usually thin at first, gradually becomes thicker, until a yellow-green pus is obtained Within several days, fluid may accumulate in sufficient quantity to cause serious embarrassment of pulmonary function Pericarditis sometimes occurs, particularly in association with empyema

Before the days of antibiotics the prognosis for elderly patients with pneumococcal pneumonia was extremely poor Heffron (1939) reported that the mortality rates ranged from 16 per cent in patients aged 20 to 29 to 66 per cent in those aged 50 to 59, and to 82 per cent in patients over 80 Since the advent of chemotherapeutic measures, these figures have been strikingly decreased although deaths still occur in the older age group

Hemolytic Streptococcal Pneumonia

Streptococcal pneumonia primarily a disease of the younger age groups, occurs in the aged less frequently than pneumococcal pneumonia It is almost always preceded by influenza, tonsillitis, or a similar infection of the upper airway The onset, which is characteristically abrupt, with chills, fever, anorexia, and vomiting, may

atypical pneumonia is characteristically a disease of younger patients Ornithosis can occur at any age Pneumonic involvement occurs in as many as 10 per cent of all patients with the common cold. In an undetermined percentage of these cases, however, the pneumonitis is the result of secondary bacterial infection that follows the viral infection

In the elderly patient, uncomplicated viral pneumonia may follow pre existing nasopharyngitis The onset of pneumonia is characterized by fever chills a dry, hacking cough, deep chest pain, malaise, fatigue anorexia headache, and myalgia Usually, signs of consolidation are absent and only a few inspiratory rales are heard

Leukocytosis does not occur, and as a rule viral pneumonia can be suspected in the presence of a normal leukocyte count and an increase in mononuclear cells Since older patients do not always show the normal leukocyte response to bacterial infection, however, a diagnosis of viral pneumonia cannot be made on the basis of this point alone Examination of the sputum shows no characteristic organisms The chest roentgenogram shows bilateral pneumonic involvement which is usually much more extensive than would be suspected from the clinical picture

In the debilitated patient viral pneumonia may cause marked asthenia and a prolonged convalescence In the otherwise healthy older person however recovery is uneventful unless the disease is complicated by bacterial infections

Bronchopneumonia or Mixed Bacterial Infection

Elderly patients often have an atypical pneumonia (bronchopneumonia) for which no specific etiologic organism can be found This type of pneumonia occurs in areas of atelectasis or pulmonary congestion or follows aspiration The infecting bacteria are the normal inhabitants of the upper airway The so called aspiration and postoperative pneumonias are of this type

The illness usually follows some primary condition, and is heralded by the development of fever tachycardia, tachypnea, and cough. It may begin suddenly Cyanosis is present, and may be more marked than in other types of pneumonia The cough may or may not be productive Examination of the chest reveals signs that vary from fine inspiratory rales to the findings of consolidation

residual pulmonary abscesses If a positive blood culture is obtained, serious effort should be made to locate some other source of infection, since staphylococcal pneumonia as a primary illness does not usually result in bacteremia Before the days of antimicrobial therapy the prognosis in staphylococcal pneumonia was extremely poor, with mortality figures ranging from 50 to 95 per cent Even at the present time, 15 to 50 per cent of the patients die (Rogers, 1956).

Friedlander Pneumonia

This is an uncommon form of pneumonia that occurs primarily in patients past middle age The incidence is higher in men with marked debility, chronic alcoholism, or chronic pulmonary disease (Barber and Grant, 1952).

The clinical pattern of Friedlander pneumonia varies It may be an acute illness with a sudden onset of chills, fever, cough, bright red and tenacious sputum, marked prostration, anorexia, nausea vomiting, diarrhea, and delirium Dyspnea and cyanosis may be marked The chronic form of the illness is characterized by an insidious onset with low-grade fever, malaise, anorexia, weight loss, night sweats, and a cough productive of tenacious sputum that may or may not be bloody On physical examination, in addition to the general signs of either acute or chronic infection, fine and medium coarse rales may be heard over the areas of lung involved Signs of consolidation are usually not striking

Leukocytosis may be observed The sputum is typically tenacious and bloody or brown, but it may be purulent The bacilli are identified on the Gram stain and by culture (Weiss, *et al*, 1951) Roentgenograms of the chest show scattered dense infiltrates in the areas of lung involved, often cavitation is present

As in other types of pneumonia, abscesses, empyema, and bacteremia may occur In aged patients the mortality is extremely high, even with antimicrobial therapy

Viral Pneumonias

A number of viruses have now been implicated as causative agents of pneumonitis in all age groups (Reiman, 1954) Primary

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Variability in chest findings is characteristic of this type of pneumonia

Chest roentgenograms show patchy pneumonitis, which may move rapidly from one portion of the lung to another As in other types of pneumonia, leukocytosis is variable, the sputum is purulent, often bloody or rusty, and contains a mixture of organisms, both on smear and on culture

Bronchopneumonia may be the terminal event of a critical illness The mortality is over 50 per cent in patients of all ages and for patients over 75 to 80 years of age may be as high as 100 per cent

Treatment

GENERAL MEASURES If the patient is moderately active, bed rest is indicated during the acute phase of a pneumonia Hospitalization is advisable in most cases, although under some circumstances the elderly patient does better in familiar surroundings The primary aim should be to provide comfort and physical and mental rest

Good nursing care is essential to the management of the elderly patient with pneumonia During the acute illness, a sponge bath followed by an alcohol rub may be particularly relaxing Oral hygiene is important Attention to the diet, together with the use of mild laxatives or an enema every other day, will prevent the complications of fecal impaction and abdominal distention Because of the danger of thrombophlebitis and pulmonary embolization, it is recommended that the patient spend a portion of the day in a comfortable chair, such as a cardiac chair, by the bedside If he is too debilitated to move from the bed, passive exercise and leg wrapping may prevent circulatory complications Ambulation and frequent changes of position in bed will also serve to promote expectoration and prevent atelectasis

No special dietary measures are required Well cooked simple and nutritious meals are preferable, although frequent feedings with liquids such as soup, fruit juice and milk are often better tolerated Small amounts of an alcoholic beverage before meals may stimulate the appetite The fluid intake should be maintained If the patient is nauseated, he may be able to retain carbonated bev-

erages In the presence of severe nausea and vomiting intravenous infusions of isotonic sodium chloride or Ringer's solution along with dextrose in sufficient quantity to provide the caloric requirements may be necessary Every effort should be made however to have the patient take food and fluids by mouth On occasion the use of a flexible soft plastic stomach tube may facilitate oral feeding and avoid the problems of an infusion

SYMPTOMATIC TREATMENT Cough can be both troublesome and exhausting To decrease cough and aid in the expectoration of sputum a steam vaporizer can be used This measure is especially important during the winter months when the patient has to breathe the dry air of conventionally heated rooms Cough syrups in variety are available which contain soothing agents antihistamines or iodides The patient with an especially exhausting cough may be given codeine or one of its derivatives either in a cough syrup or alone Inhalations of carbon dioxide (5 per cent carbon dioxide and 95 per cent oxygen) are helpful for relieving paroxysms of coughing Smoking should be prohibited

If the sputum is tenacious and difficult to expel potassium iodide or ammonium chloride will act as a liquefying agent The very debilitated individual may require mechanical measures such as bronchoscopy to clear the airway Skillful manipulation of a tracheal catheter will allow aspiration of the tracheobronchial tree In the debilitated semistuporous or comatose patient a tracheotomy is often necessary Forced expiration with an exsufflator has also been reported by Barach and Beck (1954) to be beneficial

Chest pain may be a very annoying symptom The use of a chest binder although it will relieve the pain should be avoided since fixation of the chest interferes with cough and drainage from the involved area Local application of heat often gives symptomatic relief Agents such as morphine and Demerol should be used with caution because these also depress respiration and the cough reflex in the elderly patient If the pain is particularly severe and pleuritic in nature an intercostal nerve block with procaine may give very striking relief without undesirable side effects

Hiccoughs and abdominal distention frequently add to the misery of the elderly patient with pneumonia There is no consistently satisfactory remedy for hiccough The oral administration of peppermint water alcoholic beverages ice water and carbonated

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Treatment

General Measures If the patient is moderately active, bed rest is indicated during the acute phase of a pneumonia Hospitalization is advisable in most cases, although under some circumstances the elderly patient does better in familiar surroundings The primary aim should be to provide comfort and physical and mental rest

Good nursing care is essential to the management of the elderly patient with pneumonia During the acute illness, a sponge bath followed by an alcohol rub may be particularly relaxing Oral hygiene is important Attention to the diet, together with the use of mild laxatives or an enema every other day, will prevent the complications of fecal impaction and abdominal distention Because of the danger of thrombophlebitis and pulmonary embolization, it is recommended that the patient spend a portion of the day in a comfortable chair such as a cardiac chair, by the bedside If he is too debilitated to move from the bed, passive exercise and leg wrapping may prevent circulatory complications Ambulation and frequent changes of position in bed will also serve to promote expectoration and prevent atelectasis

No special dietary measures are required Well cooked, simple, and nutritious meals are preferable although frequent feedings with liquids such as soup fruit juice, and milk are often better tolerated Small amounts of an alcoholic beverage before meals may stimulate the appetite The fluid intake should be maintained If the patient is nauseated, he may be able to retain carbonated bev-

sation in the elderly patient Digitalis preparations, salt restriction, diuretics, and oxygen therapy are indicated in this situation Occasionally, a patient with an overwhelming infection will show signs of circulatory collapse In such cases, intravenous infusions of hydrocortisone or norepinephrine may be needed

SPECIFIC THERAPY With the advent of chemotherapeutic agents and antibiotics, the treatment of acute pneumonias has changed remarkably Particularly in elderly patients, these agents have brought about a marked reduction in the mortality from all types of pneumonias Nevertheless, certain organisms such as the staphylococcus and Friedlander bacillus still present difficult problems in management

Pneumococcal pneumonia usually responds to a total daily dose of 600 000 units of penicillin This should be continued for 48 to 72 hours after the patient is afebrile Sulfonamides are effective, but their action is not as prompt as that of penicillin If the patient has had an untoward reaction to penicillin, tetracycline drugs and chloramphenicol are also effective in doses of 1 to 2 Gm daily Streptococcal pneumonia is treated in the same fashion

Because of the development of drug-resistant strains, staphylococcal infections have become much less responsive to the antibiotics (Spink, 1954) Penicillin is the drug of choice, and the initial dosage should range from ½ million to 2 million units every two hours Often as much as 50 million units per day is required to obtain an effect Erythromycin or chloramphenicol, 2 to 4 Gm daily in divided doses, is also useful Streptomycin, 2 Gm per day, may potentiate the effect of penicillin The addition of Benemid is also helpful in increasing the blood levels of penicillin Newer antibiotics such as bacitracin (15,000 to 25 000 units every 6 hours), ristocetin and kanamycin have been effective in some cases Certain strains of staphylococci are susceptible to the tetracycline drugs which should be used in doses of 2 to 4 Gm a day

Friedlander pneumonia is particularly resistant to treatment At the present time the recommended therapy is a combination of streptomycin 2 to 4 Gm daily, with chloramphenicol or tetracycline in doses of 2 to 4 Gm Response to this therapy can be expected within 5 to 7 days, and the streptomycin dosage can be reduced at that time Chloramphenicol or tetracycline should be continued for at least two weeks

water may be tried Inhalation of a 5 per cent concentration of carbon dioxide in oxygen or air sometimes relieves hiccoughs, and aspiration of a distended stomach can be effective Sedation with chloral hydrate or barbiturates is often required If the symptom continues unabated over a long period, consideration should be given to phrenic nerve block Abdominal distention is best prevented by regular bowel movements Heat to the abdomen will occasionally be helpful Often, however, the use of a rectal tube or Wangensteen suction is necessary for the relief of lower or upper gastrointestinal distention Prostigmin may also be tried to promote peristalsis

For the control of headache and myalgia, codeine is preferred to aspirin because it will not alter the temperature pattern Often an icebag or hot water bottle applied to the most painful areas will provide relief

If the patient's temperature is unusually high (in excess of 102 to 104 F), sponge baths may be used several times daily Aspirin will also lower the temperature This medication should be used cautiously, however, since the patient may respond to relatively small doses with a marked fall in the blood pressure Herpes simplex associated with fever may require symptomatic treatment

With acute infection, the elderly individual often has marked restlessness and even delirium Barbiturates are likely to increase excitability in some patients Chloral hydrate (0 6 to 1 0 Gm) and paraldehyde (8 cc) are preferred for sedation, and morphine is useful in allaying apprehension, particularly if there is the complicating element of pulmonary edema A tranquilizer such as chlorpromazine may also be given All sedatives should be administered cautiously, because depression of respiration in elderly patients with lung disease can result in hypoxia and hypercapnia

Oxygen therapy is required for the relief of hypoxia in the cyanotic patient In older people this measure should be used selectively and cautiously, since there may be an element of chronic lung disease with poor intrapulmonary gas mixing The depressant effect of oxygen on respiration may result in hypercapnia and carbon dioxide narcosis, in the manner described in the section on "Acute Ventilatory Insufficiency"

Lastly, failure of the circulation may require the physician's attention Pulmonary infection often precipitates cardiac decompen-

The symptoms associated with an abscess are cough and expectoration of large amounts (one half to one cupful daily) of sputum, which is often foul smelling Hemoptysis occurs occasionally, and cyanosis and dyspnea are sometimes features of the illness Fever, malaise, night sweats, and clubbed fingers may also be part of the clinical picture The recent past history should be carefully reviewed to disclose any situation in which unconsciousness was produced any recent surgery on the nose or throat, or any symptoms of thrombophlebitis Unless the abscess is near the surface of the lung, examination of the chest reveals no positive findings However, the patient may have fever, evidences of weight loss, and pulmonary osteoarthropathy

A chronic abscess does not usually cause leukocytosis, but may be associated with anemia. The sputum is extremely foul-smelling, and contains a mixture of organisms, including cocci, bacilli, and, in the aspiration type of abscess, spirochetes (Brock, 1948) In occasional cases one specific organism, such as the staphylococcus or Friedländer bacillus, may be responsible for the abscess Culture should be made both aerobically and anaerobically, and the sputum should be examined for fungi and tubercle bacilli The chest film will demonstrate a rounded infiltrate or cystlike area that may have a fluid level Bronchoscopy is important to reveal any evidence of obstruction

The results of therapy depend on the amount of time elapsing between the development of the abscess and the institution of treatment (Waterman *et al*, 1955) It is essential that therapy be started as soon as the diagnosis is made Bed rest and mild sedation are needed Postural drainage is useful in promoting the removal of pus and secretions Bronchoscopy will sometimes be necessary for drainage of purulent material Oxygen may be required if dyspnea and cyanosis are severe

The etiologic organisms should be identified as soon as possible, so that appropriate chemotherapy or antibiotic therapy can be instituted Many abscesses of the aspiration type are due to anaerobic streptococci and spirochetes in addition to mixed bacterial flora Penicillin (10 to 20 million units per day) and streptomycin (2 Gm per day) are the most effective combination of antibiotics After signs of acute infection have subsided, lower maintenance dosages of both drugs are sufficient

Viral pneumonias usually do not respond to antibiotics, although Terramycin and Aureomycin have been reported to be effective in some cases

Complications of pneumonia require special attention Lung abscesses call for long periods of antibiotic therapy, postural drainage, and even surgical excision Empyema is best treated with surgical drainage The instillation of streptokinase and streptodornase into the pleural space to promote drainage has also been advocated

Prevention

Because the elderly are particularly susceptible to all types of pneumonia, every effort should be made to maintain the older patient in good health and to prevent other illnesses or conditions that predispose to pneumonia Specifically, the elderly patient should stay as active as possible If he is not ambulatory, he should be turned frequently or moved from the bed to a chair at regular intervals Deep breathing exercises or inhalation of 5 per cent carbon dioxide for short periods may aid in preventing areas of atelectasis and promoting drainage from the airways If it is feasible, residence in a warm climate during the winter months is beneficial Elderly individuals should never expose themselves unnecessarily to persons with upper respiratory or pulmonary infections Prophylactic antibiotic therapy is not advisable except for the debilitated elderly patient who shows evidence of respiratory tract infection Specific vaccines for viral infections may be helpful during epidemics

CHRONIC PULMONARY INFECTIONS

Lung Abscess

The elderly, debilitated individual is an especially good candidate for a lung abscess Such an abscess may be caused by septic emboli to the lung, or by material aspirated during surgery on the nose and throat or during a period of unconsciousness resulting from a cerebral vascular accident, drugs, or anesthesia (Brock, 1948) Lung abscess can occur behind an obstruction in the airway, or may be produced by the penetration of infection from nearby structures

The symptoms associated with an abscess are cough and expectoration of large amounts (one half to one cupful daily) of sputum, which is often foul smelling. Hemoptysis occurs occasionally, and cyanosis and dyspnea are sometimes features of the illness. Fever, malaise, night sweats, and clubbed fingers may also be part of the clinical picture. The recent past history should be carefully reviewed to disclose any situation in which unconsciousness was produced, any recent surgery on the nose or throat, or any symptoms of thrombophlebitis. Unless the abscess is near the surface of the lung, examination of the chest reveals no positive findings. However, the patient may have fever, evidences of weight loss, and pulmonary osteoarthropathy.

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If the abscess has not decreased in size after 2 to 3 weeks of medical treatment, consideration should be given to surgery If the abscess has decreased in size, continued antibiotic therapy and bed rest are indicated Surgical drainage should be considered only if the abscess is associated with infection in the pleural or subdiaphragmatic space If the abscess fails to respond to appropriate antibiotic therapy or if a residual lesion remains, surgical removal of the lobe or segment involved is advisable In cases where a cyst remains after the infection has subsided, the elderly patient whose general condition will not allow extensive chest surgery can often be kept symptom free by measures to prevent future infections

Measures for the prevention of lung abscesses in the elderly or bedridden patient include careful attention to oral hygiene At surgery and during the postoperative period, use of the Trendelenburg position may prevent aspiration Patients unconscious as a result of cerebral vascular disease or oversedation should be placed with the head dependent or turned to the side If aspiration occurs, immediate bronchoscopy is necessary to remove foreign material and irritating stomach contents If the patient is unconscious after the aspiration of foreign material, a tracheotomy must be done to allow repeated removal of secretions from the trachea In the debilitated person who is a candidate for lung abscess, prophylactic antibiotic therapy is not recommended, although it is commonly used

Tuberculosis

The present incidence and mortality of communicable tuberculosis in the United States are higher after the age of 50 years than at any other time in life (Myers, 1946, Beaven, 1950) Actually, this situation has probably existed for as long as the disease has been present in mankind In some series reported, active tuberculosis was found three times more often in persons over 40 than in those under that age (Miller and Henderson, 1942) Twenty-five to 50 per cent of the patients in tuberculosis hospitals are over 50 years of age (Temple and Temple, 1950), and 65 per cent of these elderly patients are reported to have far advanced disease (Leech, 1950) The mortality from tuberculosis has been reported to be eight times greater in patients over 40 than in patients under 20 years of age

Several explanations may be offered for this high incidence of tuberculosis in the elderly Members of the present older generation were young at a time when infection with tubercle bacilli was common, and few persons escaped such infection The people who survived the illness in the late decades of the last century and the early decades of this century now compose a large group in our population who harbor the tubercle bacilli, which may break through nature's barriers and invade the surrounding lung tissue The total number of elderly patients with tuberculosis has been increased also by the increase in our senescent population, the result of medical advances that have added to man's life expectancy It is also probable that alertness of physicians to the possibility of this disease in the elderly and improved techniques for diagnosis have contributed to the increased incidence in reported surveys

As a rule, active disease appearing in older patients originates in the site of earlier infection It is unlikely that it represents contagion from younger individuals in the community who harbor the organism Human tubercle bacilli are usually responsible for the infection, although occasional cases of bovine infection occur Tuberculosis in the elderly individual may affect many parts of the body including the lung, bone, kidney, pleura, and pericardium Meningitis is not at all rare This discussion, however, will be concerned primarily with the problem of pulmonary tuberculosis of the chronic fibroid type

The clinical history of this illness in the elderly individual is variable Some patients may have active disease and positive sputum for many years without any apparent ill effects Frequently, the only symptom is a chronic cough productive of only small amounts of sputum which is passed off as bronchitis, "smoker's cough" or asthma This type of infection in an older member of a household may be responsible for extensive spread of the disease among younger members of a family It is fortunate when the patient has more obvious signs of illness, such as fever, malaise, night sweats weight loss, anorexia, diarrhea, myalgia, weakness, and arthralgia In some cases, a productive cough and hemoptysis may signal the onset of active disease

The patient may show the signs of chronic illness or may appear healthy for his age On examination of the chest, the signs of old

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residual tuberculosis with cavity formation may be detected. There may be a shift of the trachea, dullness to percussion (particularly at the apices), and bronchial or cavernous breathing and voice sounds. In acute infections, the signs of a pneumonitis may be heard. Rales or wheezes at the apices occasionally suggest active disease. Often, however, the physical findings are not particularly striking, and the diagnosis is made only with laboratory help. The disease may be first suspected from a routine chest roentgenogram made in a mass survey, during a hospital stay, or at the time of a visit to a doctor's office (Myers, 1956).

A positive diagnosis of active pulmonary tuberculosis can be made only on the basis of laboratory findings. Leukocytosis may or may not be present, but an increase in the number of large lymphocytes suggests active disease. An elevated sedimentation rate and positive C-reactive protein test are general indexes of active disease. The tuberculin test is useful in determining the presence of allergy to the tuberculin protein, and a positive reaction indicates that infection has been present at some time during the patient's life. This test is superior to chest roentgenograms in detecting the presence of a primary lesion, since the latter will fail to show such a lesion in 70 to 80 per cent of the cases. It should be noted that older individuals occasionally do not react to the usual dilutions of tuberculin, and larger test doses may be required to demonstrate a positive reaction. The tuberculin test may also be negative in the presence of an overwhelming tuberculous infection. Roentgen examination is helpful in evaluating gross lesions, in detecting their location, and, when compared with earlier films, in determining the degree of activity. The proof of active disease is established ultimately by finding the tubercle bacilli in the sputum on acid-fast smear or by culture. If the patient does not produce sputum, postural drainage may aid in obtaining a specimen, or gastric washings may be required. Occasionally, the diagnosis can be made from examination of pleural fluid, from biopsy of the pleura or fat pad, or at exploratory thoracotomy.

The management of the elderly patient with active tuberculosis has been aided immeasurably by the advent of specific antimicrobial therapy. The depressing and adverse effects of prolonged bed rest in a sanatorium can now be eliminated in most cases. Certainly bed rest is indicated for older patients with evidence of active dis-

ease but this need not be as strict as that required for younger patients or as that practiced before the days of antimicrobial therapy Isolation particularly from younger individuals is still necessary Often the patient who lives alone with husband or wife may be cared for satisfactorily at home Diet should be adequate and depending on the general state of the individual supplemented with vitamins In addition any associated acute or chronic illness should be handled early and appropriately

All patients with active disease should receive drug therapy At the present time there are a number of antimicrobial agents that are effective against the tubercle bacillus Those most commonly used are streptomycin para aminosalicylic acid (PAS) and isoniazid (INH) Cycloserine Pyrazinamide and viomycin have a definite antimicrobial effect but they are less effective The combination of isoniazid (300 to 400 mg daily) and para aminosalicylic acid (12 to 16 Gm daily) offers the best regimen (Tucker and Livings 1955) If the patient cannot tolerate para aminosalicylic acid which has the advantage of being an oral medication 1 Gm of streptomycin given intramuscularly twice a week is a satisfactory substitute (Cohen 1956)

Variations in the duration and type of therapy will depend on the response of the lesion and the persistence of positive sputum If roentgenograms show clearing of the lesion and sputum examinations are consistently negative treatment with PAS or streptomycin is stopped after 12 months and isoniazid is continued for 6 to 12 additional months If residual disease persists some authorities advocate continuation of isoniazid (300 mg per day) indefinitely It has been reported recently that dosages of isoniazid as high as 600 mg daily may be advantageous Such large doses may cause peripheral neuritis and for this reason the prophylactic administration of pyridoxine is recommended If signs or symptoms of peripheral neuritis develop with the dose of 300 to 400 mg per day consideration may be given to adding pyridoxine to the therapy or to [illegible]

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branching, Gram positive, filamentous organism that infects the face and neck. Pulmonary involvement may result from aspiration or hematogenous spread, and the lower lobes are usually affected (Garrod 1952). The patient complains of fever, cough, and expectoration The diagnosis is based on the observation of sulfur granules in the sputum Identification of the organisms in the sputum is not difficult. Penicillin (1 2 million units per day) and the tetracycline antibiotics (2 to 4 Gm per day) are effective The treatment should be continued for at least 4 to 6 weeks, and longer courses may be required

CRYPTOCOCCOSIS The infecting organisms are spherical cells that retain Gram stain and are surrounded by a capsule sometimes two to three times larger than the cell proper The disease is usually generalized, involving the nervous system, lungs, bone, or skin (Littman and Zimmerman, 1956) When the infection is limited to the lungs, the patient is generally free of constitutional symptoms The chest lesion may be noted on a routine chest roentgenogram The organism may be identified in sputum cultures, or in biopsy material obtained at exploratory thoracotomy Two hydroxy stilbamidine has been used, but its value is uncertain Amphotericin B has also been recommended

BLASTOMYCOSIS The fungus is a yeastlike, budding form which, in fresh specimens of sputum, has a clear, refractile capsule The infection is generalized and often involves the lungs Although it appears to be a disease of the younger age group, some of the patients in reported epidemics have been in the seventh and eighth decades of life (Smith *et al*, 1955) Manifestations of pulmonary infection include fever night sweats, and cough productive of sputum Diagnosis is made by identifying the organisms in the purulent sputum or by isolating them on culture Material for skin testing is available and a positive test indicates that infection has occurred at some time Complement fixing antibodies may also be identified Patients with marked dermal hypersensitivity and low serum titers of complement fixing antibodies have a better prognosis than those with a negative skin test and a high complement fixation titer

Two hydroxy stilbamidine is extremely effective in this disease, and should be given by slow intravenous drip in doses of 225 to 150 mg per day A total dosage of 12 to 15 Gm may be required and the course can be repeated after several months Amphotericin

pulmonary function, thoracoplasty may be indicated to convert the sputum and allow him to return to society (Kallqvist, 1955) As in other chest diseases that may require surgery, such as bronchiectasis, lung abscess, or tumor, the present techniques of anesthesia and surgery now permit resection of involved areas of the lung in many elderly patients who would not previously have been able to tolerate the procedure Most elderly patients in general good health who have persistently positive sputum or large cavities in a localized area may be candidates for resection (Kallqvist, 1956) Surgery may be prohibited by concomitant disease that causes some degree of ventilatory embarrassment, either because of the risk at operation or because of the likelihood that severe pulmonary insufficiency will occur after removal of functioning lung

What will be the status of elderly people in the next generation as regards tuberculosis? Theoretically, if both old and young patients with active tuberculosis can be detected isolated and treated effectively, the disease may be controlled (Myers, 1955) Limited experience in specific communities has demonstrated that this is possible As concepts of the epidemiology of tuberculosis evolve, it probably will be found advisable to treat all younger persons with effective antimicrobial agents as soon as a positive tuberculin test is detected The finding of a positive tuberculin test during infancy and the early years of childhood is now universally accepted as an indication for treatment If the present younger generation is protected from infection and active disease is treated at its inception it is conceivable that within one to two generations elderly persons will no longer have an opportunity to contract the disease or have an endogenous source for infection Our concepts of the geriatric problems of tuberculosis may well be altered in the next half century

Fungous Diseases

In all age groups pulmonary fungous infections resemble tuberculosis more closely than any other nontuberculous disease The elderly individual is susceptible to such infection and associated illnesses a debilitated state or therapeutic agents may make him susceptible to fungi not usually pathogenic

Actinomycosis The fungus responsible for this disease is a

branching Gram positive, filamentous organism that infects the face and neck Pulmonary involvement may result from aspiration or hematogenous spread, and the lower lobes are usually affected (Carrod 1952) The patient complains of fever, cough, and expectoration The diagnosis is based on the observation of sulfur granules in the sputum Identification of the organisms in the sputum is not difficult Penicillin (1 2 million units per day) and the tetracycline antibiotics (2 to 4 Gm per day) are effective The treatment should be continued for at least 4 to 6 weeks, and longer courses may be required

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B, given orally or intravenously, is also reported to be effective. The daily dosage for intravenous administration is 0.25 mg. per kilogram of body weight; this can be increased gradually to a maximum of 1.5 mg. per kilogram. These agents have produced a remarkable decrease in the previously high mortality rate.

HISTOPLASMOSIS. Histoplasmosis occurs in large numbers of people in endemic areas, but it is usually asymptomatic. Although the clinical illness affects primarily young individuals, it will appear occasionally in older patients. It is differentiated from tuberculosis by finding the fungus in sputum, gastric washings, bone marrow, blood, or biopsy material. A positive histoplasmin skin test indicates present or past infection. The complement fixation test is more likely to be positive only in the presence of active disease. Treatment with chemotherapeutic agents, including two-hydroxy stilbamidine, has not been particularly successful.

COCCIDIOIDOMYCOSIS. This is a disease endemic to the southwestern states, and infections are often completely asymptomatic A routine chest roentgenogram may show scarring and calcification in the lung, and a positive skin test denotes infection at some time in the patient's life. The diagnosis of active disease is made by finding the organisms in the sputum or gastric washings. Results of chemotherapy are not dramatic, although two-hydroxy stilbamidine and Amphotericin B may be effective. Surgical excision of residual pulmonary foci is indicated if secondary infection or hemoptysis occurs.

MONILIASIS. Infection of the lungs with *Candida albicans* is most apt to appear in the debilitated person who has some other chronic illness. Often he is receiving steroids or intensive antibiotic therapy (Kligman, 1952). Fever, chest pain, cough, sputum, and the findings of a diffuse pulmonary infiltrate in the elderly, debilitated patient who is receiving antibiotics or steroids should lead the physician to suspect this illness. If a patient with pulmonary disease shows the lesions of thrush in the mouth and throat, moniliasis is to be suspected. Diagnosis is difficult because the organism is a normal inhabitant of the mouth; but when several cultures of *Candida albicans* are obtained in the proper clinical setting, the diagnosis should be seriously considered. At the present time nystatin appears to be an effective agent for this illness (Wright, *et al.*,

1956) Potassium iodide and a vaccine made from heat killed *Candida albicans* may be helpful also

BRONCHITIS AND BRONCHIECTASIS

Acute Bronchitis

Acute bronchitis may result from infection with various bacteria and viruses, as well as from chemical and physical agents The symptoms usually consist of cough and sputum production If infection is primarily responsible for the illness purulent sputum, malaise, and fever may be noted On physical examination, coarse inspiratory and expiratory rales and wheezes may be heard

The illness is often self limited and requires only symptomatic treatment The patient should obtain adequate rest, maintain a good fluid intake, and follow a bland diet The various types of soothing cough syrups and expectorants will also provide symptomatic relief A humidifier may be necessary during the winter months In the presence of fever, antibiotic therapy is indicated, particularly if the patient's general condition makes him a good candidate for pneumonia

Chronic Bronchitis

Chronic bronchitis is one of the most common problems of the aged (*Sheldon 1948*) It is usually associated with a long history of bronchial infections and exposure to dust and other chemical or physical irritants Recurrent infections of the upper airway, such as sinusitis are also contributory In susceptible patients, tobacco smoking may be a primary factor in the development of chronic bronchitis (Clough 1956) The pathologic characteristics of the disease include loss of areas of normal mucosa, infiltration with mononuclear cells increased fibrous tissue, and hypertrophy of the mucous glands

The primary symptom is a chronic cough with or without expectoration The sputum may be purulent or gray mucoid in character and hemoptysis is common In the elderly, coughing may occasionally lead to syncope (Derbes and Kerr, 1955) Loud in

spiratory and expiratory musical rales may be heard on physical examination, and in many cases findings of obstructive emphysema are also present The sputum contains a mixture of organisms A diagnosis of chronic bronchitis should always be critically reviewed by the physician because of the number of illnesses that produce the primary symptoms of cough, expectoration and occasional hemoptysis The differential diagnosis of cough in the elderly should include acute and chronic pulmonary infections, circulatory disorders, and tumor (Arkin, 1956)

Treatment of chronic bronchitis is most successful when the etiologic agent can be identified and eliminated This is not often easy If the illness is due to inhalation of various chemical or physical irritants such as dust, fumes, or smoke, the patient may be helped to avoid exposure by the use of air conditioning or a mask When tobacco smoking is a factor, its elimination provides striking relief Symptomatic treatment consists of the measures mentioned in the preceding section on acute bronchitis Although it is occasionally necessary to suppress the cough reflex, agents for this purpose should be used cautiously, since elimination of secretions will also be inhibited When signs of infection are present, antibiotic therapy is advisable

Bronchiectasis

This disease process is characterized by saccular or cylindrical dilatations of the bronchi Bronchiectasis may be limited to one lobe, or several lobes may be involved In three fourths of the patients the disease is located at the lung base Although bronchiectasis is characteristically a disease of the younger age group effective therapy permits many patients to survive to old age Sometimes the earliest manifestations of the disease are evident after 45 years of age The etiology of bronchiectasis remains unknown Congenital abnormalities of the bronchi and pulmonary circulation may be responsible and localized bronchiectasis can occur behind an obstruction of the airway Bronchiectasis is often preceded by other acute or chronic pulmonary disease and in animals the aging process apparently is responsible for a type of bronchiectasis (Saxton *et al* 1946)

Cough and expectoration are the usual symptoms Although the

quantity of sputum may be small, large amounts (as much as one to two pints a day) are characteristic. Change of position increases sputum production, particularly when the head and thorax are dependent. Hemoptysis is frequently severe and most troublesome. Bronchiectasis should be suspected in elderly patients with cough and hemoptysis, and in those who have recurrent pneumonia. It is a disease frequently attended by general systemic manifestations, which incapacitate the patient. Recurrent attacks of pleural pain, fever, night sweats, weight loss, hemoptysis, and dyspnea may all contribute to the patient's disability.

With acute exacerbation of the disease, or as it progresses chronically, medium loud inspiratory rales may be heard over the involved areas. Clubbing of the fingers and toes is often seen, and occasionally there is both clinical and radiologic evidence of pulmonary osteoarthropathy.

The differential diagnosis of cough, expectoration, and hemoptysis in older patients includes many possibilities. Sputum examination and culture are essential to rule out specific bacterial and fungous infections. Bronchoscopy is indicated to detect possible obstruction of the airways. The diagnosis of bronchiectasis is made by the demonstration of saccular or cylindrical dilatation with bronchography. Bronchograms should be done in the aged only when they will be of definite value, because they are taxing for the debilitated patient.

Both the diagnostic and the therapeutic program for elderly patients should take into account the individual as a whole (Pittman 1955). The symptoms of bronchiectasis can be controlled with a good medical regimen, and as in other chronic illnesses, adequate rest and good diet are prerequisites to therapy. Effective postural drainage practiced two to three times a day is essential. The elderly patient often requires assistance with postural drainage, and if he is completely bedridden it will be helpful to elevate the foot of the bed. The use of a [illegible] an aerosol before postural d[illegible]

During acute exacerbations, when the patient has fever and other signs of acute infection, oral or parenteral antibiotic therapy is indicated. A combination of penicillin (0.8 to 1.2 million units per day) and streptomycin (2 Gm. per day) is most effective. Any of the broad spectrum antibiotic or sulfonamide drugs can be used,

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however, depending on the circumstances of the illness Aerosol antibiotic therapy has been used, but it is not as effective as oral or parenteral medication and increases the chance for development of hypersensitivity to the antibiotic. Finally, every effort should be made to prevent respiratory infections One method is the prophylactic administration of a chemotherapeutic agent such as Gantrisin, in dosages of 1.0 to 1.5 Gm. per day.

Surgical removal of the involved areas is the only cure for bronchiectasis In the past, this has not been considered feasible for most elderly patients Surgery should certainly not be considered for a patient with extensive bilateral disease, coexistent heart disease, or impairment of pulmonary function. However, if the elderly individual is in good health and has localized disease and pulmonary function near the normal for his age, consideration should be given to surgical treatment. Occasionally surgery may be necessitated by severe recurrent hemoptysis.

ALLERGIC DISORDERS

Allergy is usually defined as the capacity of an individual to react adversely to a foreign substance after initial exposure Although bronchial asthma is the most important pulmonary disorder of allergic origin, the collagen diseases, Loeffler's syndrome, sarcoid, and certain pneumoconioses should be included in this category (Sieker, 1959) Asthma resulting from allergy is predominantly an illness of the younger age group, but may continue into the later decades of life In the elderly individual a different type of asthma develops in association with infection and chronic bronchitis It has been estimated that almost half the cases of asthma are found after the age of 40

A number of classifications of asthma have been suggested, but the simplest is to consider the illness as either extrinsic (atopic) or intrinsic (nonatopic) Extrinsic asthma is characterized by paroxysms of wheezing, dyspnea, and cough occurring in the young individual with a strong family history of allergic disorders Intrinsic asthma occurs in older patients, tends to be chronic, and may or may not be related to an earlier history of asthma Definite allergens and infections, physical factors, fumes, and emotional stresses may produce asthma in the elderly patient (Rowe and

Rowe 1947 Kern 1951 Forman and Blatt 1954) A type of wheezing and dyspnea called cardiac asthma should not be confused with the bronchial disease being considered in this section

The pathologic physiology of asthma has been the subject of investigation for many years Three basic processes are involved These are (1) edema and congestion of the bronchial mucosa (2) excessive production of tenacious sputum and (3) probably least important bronchospasm or constriction of bronchial muscles The exact mechanism by which these changes in the airways are produced is complex and not well understood Histamine serotonin acetylcholine and electrolyte derangements have all been implicated but to date none of these factors has been definitely established as the link between etiologic agents and obstruction of the airway

The elderly patient with asthma usually has a chronic illness Some degree of wheezing and dyspnea particularly on exertion is present most of the time Cough productive of clear thick mucoid sputum is also noted During acute attacks the individual may have extreme respiratory embarrassment with wheezing dyspnea cough and cyanosis During the chronic stage the patient may show the physical findings of emphysema (to be discussed later) In the paroxysm of a severe attack the patient sits upright with all respiratory muscles tensed and characteristically leans forward on his elbows In addition to the findings of emphysema many loud whistling wheezing rales may be heard throughout both lung fields

Laboratory findings include eosinophilia in the peripheral blood and Charcot Leyden crystals Curschmann s spirals and eosinophils in the sputum Chest roentgenograms during the chronic stage will show the changes of emphysema and in acute paroxysms will show hyperinflation of the lung The chest film is also useful in ruling out pneumonitis and pneumothorax

Treatment may be divided into measures that are designed simply to relieve an attack of asthma and those designed to prevent attacks (Sheldon *et al* 1954) Epinephrine (1 1000) provides almost immediate relief from an acute attack when given subcutaneously or intramuscularly in doses of 0 2 cc to 0 4 cc This drug may also be used as an aerosol in a 1 100 dilution Ephedrine may be given in place of epinephrine but is not as effective in acute attacks Isuprel (1 200) is a good aerosol medication and

often is combined with Alevaire or another liquefying agent A compressor or oxygen tank may be used with the nebulizer to provide an adequate spray Aminophylline is an effective medication that may be given slowly by vein in doses of 0 25 to 0 5 Gm Potassium iodide is an effective oral agent for liquefying the sputum Sensitivity to iodides is not uncommon, however, and should be suspected whenever increased lacrimation, rhinorrhea swelling of the parotid gland, fever, or acneform eruption follows iodide therapy Steam vaporization, particularly during the winter months, will help liquefy the sputum and give subjective relief Cortisone, the cortisone derivatives, and corticotropin have proved to be extremely effective in acute asthma and status asthmaticus Consideration can be given to long-term therapy with corticosteroids in low dosages, but the possibility of adverse effects should be recognized The antihistamine drugs, which are helpful in other allergic disorders, are of no value An acute attack of asthma may require bronchoscopic drainage and the use of an exsufflator to help clear the airway

Anxiety is often an important feature of asthma, both as a cause and as a result, and measures to relieve it are desirable In general agents such as morphine and Demerol should be avoided, and barbiturates may be responsible for drug reactions and increased excitability in the elderly patient Chloral hydrate is probably the least dangerous sedative for the older person Reserpine compounds are best avoided in the elderly, because of the frequency with which depression occurs Tranquilizing agents may be useful for the very anxious patient

While the elderly patient is less responsive to allergens than younger individuals, it is advisable for him to avoid any factors to which he has a known sensitivity as determined by the history and skin tests If the sensitizing agents cannot be avoided, consideration should be given to desensitization therapy although this is less effective in old age than in youth Infection has been recognized as a factor responsible for intrinsic asthma in elderly persons Prophylactic antimicrobial therapy is favored by some, and a sulfonamide drug such as Gantrisin (1 0 to 1 5 Gm per day) is preferred to the antibiotics Bacterial vaccines have been employed, but the efficacy of this type of treatment has not been fully established

Asthma, even in the elderly patient, is a disease associated with

low mortality and high morbidity. The elderly asthmatic can die during an acute paroxysm, however, and chronic asthma may lead to the complications of pulmonary fibrosis, emphysema, and cor pulmonale, resulting in pulmonary insufficiency and cardiac decompensation.

PULMONARY FIBROSIS AND EMPHYSEMA

Fibrosis

Pulmonary fibrosis is one of the most common abnormalities found in the lungs of patients over 40 years of age. A number of factors contribute to its development, and usually pulmonary emphysema occurs in association with the process. Exposure to fumes and dust, chronic infection, and illnesses of unknown etiology, such as sarcoid, result in fibrosis. Diffuse interstitial fibrosis and the collagen diseases have been recognized more frequently as causes of this condition (Rubin and Lubliner, 1957; Read, 1958). Etiologic agents or illnesses are listed in Table 16-2.

Pulmonary fibrosis is usually associated with some degree of emphysema, and the symptoms and signs are related to the com-

TABLE 16-2 CAUSES OF PULMONARY FIBROSIS

1. Infections
   a. Tuberculosis
   b. Fungous diseases
   c. Bronchiectasis
2. Pneumoconioses
   a. Silicosis
   b. Asbestosis
   c. Bauxite (Shaver's disease)
   d. Berylliosis
   e. Diatomite fibrosis
   f. Talc fibrosis
   g. Siderosis
   h. Bagassosis
   i. Byssinosis
   j. Anthracosilicosis
3. Noxious fumes and gases
   a. Sulphur dioxides
   b. Nitrogen oxides
   c. Metal fumes
   d. Acetone
   e. Ammonia
   f. Carbon tetrachloride
4. Asthma and bronchitis
5. Sarcoidosis
6. Collagen diseases
7. Interstitial pneumonia (Hamman-Rich syndrome)
8. Radiation
9. Farmer's lung (moldy forage)
10. Lipid pneumonia

bined process The primary process producing the fibrosis may cause cyanosis and dyspnea, because it impairs diffusion of oxygen across the alveolar capillary membrane The fibrosis itself may restrict ventilatory movement enough to produce dyspnea and signs of pulmonary insufficiency Cor pulmonale and heart failure may be serious complications of this process

From the physiologic standpoint, pulmonary fibrosis without emphysema is quite different from the combination of the two (Wright and Filley, 1951) With fibrosis alone, vital capacity and total lung capacity are usually reduced Arterial oxygen saturation is normal, and carbon dioxide tension may be lowered In more advanced forms of the disease, arterial oxygen unsaturation occurs and the carbon dioxide tension is usually less than 40 mm of mercury Decrease in oxygen tension occurs primarily because the thickened alveolar walls cause an increase in the alveolar capillary gradient for oxygen

There is no satisfactory treatment for chronic pulmonary fibrosis The condition may be prevented if factors such as exposure to silica dust are avoided early in life There is some evidence that, in such processes as Boeck's sarcoid, steroid therapy provides relief from symptoms, but it is not certain that the development of fibrosis is prevented If the fibrosis is limited to a lobe or segment of a lobe, as in pulmonary tuberculosis, surgical removal may be beneficial

Cystic Disease of the Lung

Cystic changes in a portion of the lung are fairly common in later life They may be congenital or may result from disease processes such as tuberculosis, fungous infections, or abscesses Occasionally cystic changes occur without recognized antecedent pulmonary disease The cysts usually communicate directly with the tracheobronchial tree, and air and fluid pass in and out freely With distortion or infection of the bronchus, obstruction will sometimes produce a tension cyst that collapses a major portion of the lung

The symptoms of cystic disease are dyspnea, chronic cough, and recurrent pulmonary infection The diagnosis is usually evident on examination of the chest roentgenogram

Treatment has two objectives (1) prevention or correction of

infections in the cystic areas, and (2) improvement of ventilation by surgical obliteration of the cysts (Fitzpatrick, *et al*, 1957). Physiologic studies aid in the selection of patients for surgical removal of blebs, with a view to alleviating dyspnea that is troublesome or incapacitating for the individual (Baldwin, *et al*, 1950) Significant observations are the measurement of intrapulmonary gas mixing—for example, by the open circuit helium method—and determination of arterial carbon dioxide tension In the presence of cysts that are impinging on otherwise good lung function, the helium washout will be prolonged and carbon dioxide tension will be slightly low (less than 40 mm of mercury) Under these circumstances good results can be expected to follow obliteration of the cyst or cysts, particularly when they are limited to one region of the lung If the helium washout is prolonged and the carbon dioxide tension is higher than normal, a poor result may be expected as far as respiratory symptoms are concerned

Emphysema

Pulmonary emphysema is another condition prevalent in the geriatric age group The chief anatomic features are pulmonary hyperinflation rupture of alveoli and a decrease in aerating surfaces, destruction of the pulmonary capillary bed, inflammation and degeneration of the bronchi and obliterative changes in the bronchial circulation Classifications of pulmonary emphysema are based on etiology clinical findings and function alterations So-called senile emphysema is hyperinflation of the lungs, which is due to change in the chest size and configuration (Kountz and Alexander, 1934) It occurs typically in the elderly, obese individual with a pendulous abdomen and a low diaphragm Most pulmonary emphysema of clinical importance is obstructive in type Some cases of pulmonary emphysema associated with large cysts appear to result from primary atrophy of the lung tissue (Richards 1956)

Pathologic Physiology Obstructive emphysema is the result of chronic or recurrent disease of the airway loss of pulmonary elasticity and change in the chest size and configuration (Dayman, 1951 Mead *et al* 1955, West, *et al*, 1951, Ebert, 1956) The principal functional derangement is an increase in airway resistance during expiration The bronchi normally narrow to some degree

during expiration, but in conditions producing emphysema this narrowing is exaggerated by thickening of bronchial mucosa excessive accumulation of mucus, and bronchospasm The loss of peribronchial elastic tissue, which normally holds the bronchi open contributes to obstruction of the airway The obstruction causes hyperinflation of the lungs, with resultant rupture of the alveolar

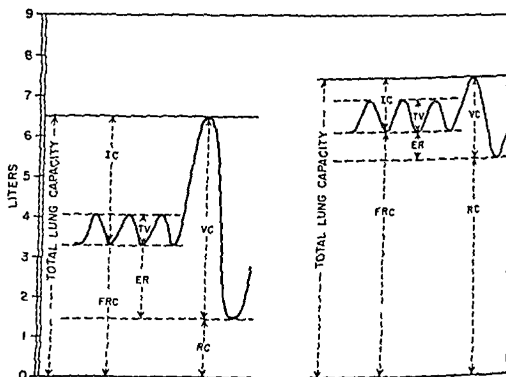


Fig 16 1 (*Right*) Diagrammatic presentation of subdivisions of lung volume in an elderly patient with emphysema showing a marked increase in total lung volume and residual capacity and a decrease in vital capacity (*Left*) Normal subdivisions of lung volume *VC* = vital capacity *IC* = inspiratory capacity *TV* = total volume *ER* = expiratory reserve *FRC* = functional residual capacity *RC* = residual capacity

wall, loss of aerating surface and destruction of the capillary bed These changes in turn favor progression of the process in the bronchi

Most of the recent advances in the diagnosis and evaluation of pulmonary emphysema are the result of pathophysiologic studies on the lungs (Baldwin *et al*, 1949 Barach and Bickerman 1956 Comroe, 1955) *Figure 16 1 shows the changes in lung volumes* observed in a case of obstructive pulmonary emphysema as compared to normal values The *total lung volume is usually increased*

and the functional residual capacity, or the resting lung volume, is greatly increased This change occurs because the thorax, through both phases of respiration, tends to remain in the position of near maximum inspiration The residual capacity of the lung (that portion of the lung volume which cannot be changed by maximal expiration) is also greatly increased, while the vital capacity is usually decreased The ratio of residual capacity to total lung volume is above the upper limits of normal (35 per cent)

Because of the change in resistance in the airways, particularly during expiration, the ventilation rate is altered The timed vital capacity is decreased, with less than 80 per cent of the vital capacity being delivered in the first second In most cases the maximal breathing capacity, normally 80 to 120 liters a minute, depending on age and sex, is markedly decreased In addition to this alteration in the normal mechanics of ventilation (Fry, *et al*, 1954) intrapulmonary gas mixing is much poorer in the presence of pulmonary emphysema than in the normal lung (Cournand, *et al*, 1941, Hickam, *et al*, 1954) The diffusion capacity of the emphysematous lung is also decreased and the end results are arterial oxygen unsaturation and carbon dioxide retention The degree of hypoxemia and hypercapnia is dependent on the severity of emphysema and on any additional embarrassament of ventilation superimposed by acute processes such as infection

Clinical Findings The patient with senile emphysema may have no symptoms or may have only slight dyspnea with exertion In obstructive emphysema the symptoms of the primary process may be responsible for many of the patient's complaints An emphysematous patient with bronchial asthma, for example, has primarily the symptoms associated with paroxysms of asthma When pulmonary emphysema becomes symptomatic, the most common complaint is dyspnea first on exertion, then, as the disease progresses, at rest In contrast to heart failure, emphysema is rarely responsible for orthopnea and the patient may find that he is *more* comfortable recumbent, or even with the head dependent When the disease has progressed sufficiently, cyanosis may be observed Usually the illness is prolonged, although in some cases pulmonary insufficiency or heart failure develops rapidly after the first signs of the condition appear

When the disease is moderately advanced, the patient appears

thin, dyspneic, and chronically ill. The skin is dry, and pigmentation may be increased. Characteristically the chest is described as barrel-shaped, with an increase in the anterior-posterior diameter, although severe symptomatic emphysema may be present without this apparent change in chest shape. The intercostal spaces are widened and retracted. The patient makes aborted inspiratory movements of the anterior portion of the chest, and by measurement the circumference may change only an inch or less. The chest is hyperresonant to percussion, the diaphragm is low and moves poorly, and breath sounds are distant or absent. Blood pressure varies, but in severe emphysema hypotension has been observed. The heart size is difficult to determine accurately. The remainder of the physical findings are dependent on the presence or absence of complications of emphysema. Clubbing of the fingers is occasionally noted in association with hypoxia.

Classically, emphysema produces laboratory evidence of polycythemia. This is often not the case, however, especially when carbon dioxide retention has occurred. The chest roentgenogram shows wide intercostal spaces, a low diaphragm, and increased radiolucency of the lungs (Fig. 16.2). Frequently, however, the appearance of the chest film correlates very poorly with objective measures of pulmonary function. The electrocardiogram may be normal, or may show right axis deviation and right ventricular strain.

TREATMENT. Therapy is aimed primarily at improving efficiency of ventilation and preventing progression of the emphysema (Segal and Dulfono, 1953). Vigorous exertion should be avoided. The use of bronchodilator drugs such as Isuprel aerosol, two to three times a day, followed by breathing exercises and postural drainage, helps maintain clear airways. A pressure source for the nebulizer or an intermittent positive pressure breathing apparatus provides effective inhalation therapy. To obtain maximum and even distribution of the aerosol, it is recommended that the patient inspire and expire slowly. Antibiotics should be used when there is evidence of infection. Prophylactic chemotherapy may also be indicated during the winter months and an agent such as Gantrisin (1 to 1.5 Gm per day) is suggested. Continuous therapy with small doses of one of the corticosteroids may also be helpful.

A feature that may complicate the illness and its management is

the depression that often occurs in geriatric patients with chronic disease It is particularly striking in individuals with pulmonary emphysema because of the chronic, progressive nature of the illness,



Fig 16-2 Roentgenogram showing large cysts or bullae in the lungs of an elderly patient with pulmonary emphysema

the marked disability and the slow response to intensive treatment. Patients should be given repeated encouragement and support, and should be provided with the opportunity to develop interests that do not tax their pulmonary reserve

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tube is put in place and breathing is assisted with an automatic respirator such as the Drinker tank respirator an intermittent positive pressure valve with automatic cycling device or a positive negative automatic resuscitator Oxygen is usually required and under these circumstances can be administered safely An intravenous infusion of corticotropin hydrocortisone or a similar derivative of the corticosteroids is necessary In the presence of hypotension and shock norepinephrine should be given by infusion Because infection frequently occurs antibiotics should also be started If evidence of congestive heart failure is present digitalization and the use of diuretics are necessary

If the patient does not respond within 24 to 36 hours this program should be modified A tracheotomy may be required to reduce the respiratory dead space and to allow bronchial drainage by aspiration In these circumstances the tank respirator should then be used to assist breathing

Cor Pulmonale

A number of factors operative in pulmonary fibrosis and emphysema contribute to the development of pulmonary hypertension and congestive heart failure (Harvey *et al* 1951) These include (1) a decrease in the pulmonary capillary bed (2) an increase in cardiac output (3) an increase in blood volume and viscosity and (4) hypoxemia and probably hypercapnia Left ventricular decompensation frequently occurs in combination with right sided failure

Because the symptoms and signs of cor pulmonale and heart failure are similar to those of progressive pulmonary emphysema recognition of these complications is difficult In addition to exertional dyspnea the patient with heart failure has orthopnea ankle edema and ascites Unfortunately the onset of cardiac decompensation is insidious and the condition may be far advanced before it is recognized

Physical findings helpful *in making* the diagnosis [illegible]
gorgement of [illegible]
split pulmonic [illegible]
hepatomegaly [illegible]
right axis dev[illegible] ges of ventricular strain Venous pressure is elevated but the circulation time is usually normal

gressive disease, although the rate of progression may vary from case to case Often the gradual progression is interrupted by the development of acute ventilatory insufficiency, or complicated by cor pulmonale and congestive heart failure

Acute Ventilatory Insufficiency

In severe emphysema, chronic alveolar hypoventilation produces some degree of hypoxia and hypercapnia The respiratory center becomes acclimatized to the elevated carbon dioxide, with the result that hypoxia is the stimulus for respiration Acute bronchial or pulmonary infections, congestive heart failure, oversedation, or any process that impairs ventilation further may contribute to oxygen unsaturation and carbon dioxide retention Hypoxia requires the administration of increased concentrations of oxygen but this removes the stimulus for breathing and accelerates the retention of carbon dioxide (Hickam, *et al*, 1952)

Ventilatory failure and carbon dioxide intoxication, with or without hypoxia, may produce a neurologic and circulatory disorder (Sieker and Hickam, 1956), characterized by alterations in the state of consciousness, unreactive pupils, papilledema retinal hemorrhages, hyperreflexia or hyporeflexia, abnormal superficial reflexes and circulatory failure with the clinical picture of shock Death occurs if the process is not halted or reversed

Carbon dioxide narcosis should be suspected when patients with chronic pulmonary disease become confused, semistuporous, or unconscious In these circumstances a high carbon dioxide combining power in the blood and an acid urine serve to confirm the diagnosis, which can be established by the determination of the pH and carbon dioxide tension of the arterial blood

Treatment of carbon dioxide narcosis requires a combination of measures If the patient is unconscious, hypoventilative, and hypotensive, aid to ventilation and support of the cardiovascular system are essential The following therapeutic program has been successful in preventing death of the patient from carbon dioxide intoxication (Sieker and Hickam, 1956) After the possibility of some complication such as a pneumothorax has been eliminated a bronchoscope is passed to relieve obstruction of the airway and to instill bronchodilator drugs deep in the bronchi Following this, an endotracheal

tube is put in place and breathing is assisted with an automatic respirator such as the Drinker tank respirator an intermittent positive pressure valve with automatic cycling device or a positive negative automatic resuscitator Oxygen is usually required and under these circumstances can be administered safely An intravenous infusion of corticotropin hydrocortisone or a similar derivative of the corticosteroids is necessary In the presence of hypotension and shock norepinephrine should be given by infusion Because infection frequently occurs antibiotics should also be started If evidence of congestive heart failure is present digitalization and the use of diuretics are necessary

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[illegible] ...ges of ventricular strain Venous pressure is elevated but the circulation time is usually normal

When the physician has reason to suspect congestive failure resulting from cor pulmonale, it is often necessary to treat the patient for this condition even though the diagnosis cannot be unequivocally established. In such cases management of emphysema should be continued as outlined earlier in this section. Hypoxia should be corrected; digitalization, salt restriction, and the use of diuretics are necessary (Harvey, *et al.*, 1953). The pulmonary blood volume may be reduced by phlebotomy or by the use of vasodilator drugs. It should be emphasized that the patient's response to therapy may be gradual, and that the strict regimen should be followed diligently even though immediate improvement is not obvious.

PULMONARY EMBOLIZATION AND INFARCTION

Pulmonary embolization is a frequent and serious complication of many chronic illnesses. The incidence of embolization is known to be greatest in the older age group. In approximately 75 to 90 per cent of the cases emboli arise from thrombi in the venous system of the lower extremities and pelvic areas; however, they may also originate from the right side of the heart and occasionally from veins of the upper extremities.

Pathologic Physiology

Three factors are considered important in the development of thrombi in the venous system. These are: (1) slowing of the venous circulation, (2) damage to the vein wall, and (3) alterations in the coagulation of blood. Venous stasis often occurs in debilitated elderly patients, and may be exaggerated by heart failure, surgery, or hypotension. The factors responsible for damage to the vessel wall are not usually evident, but it is known that immobilization, pressure, infection, and trauma can injure the vein. Coagulation of blood has been shown to be altered in such circumstances as surgery, polycythemia, and cancer. Heart failure, myocardial damage, and arrhythmias are likely to produce thrombi in the right side of the heart. As a rule, the occurrence of embolization is less likely if the thrombus is surrounded by a good deal of inflammation, which promotes organization of the clot.

Once the embolus has arrived in the lung, infarction may or may not be produced The base of the lung, particularly the right lower lobe, is the area most frequently involved The consequences of pulmonary embolization are varied, and the exact course of events is not well understood Mechanical, reflexive, and humoral factors have been implicated (Parker and Smith, 1958) Infarction follows embolization in about half of the recognized cases, and is more likely to occur in the presence of infection or congestion (Roach and Laufman, 1955) Immediate death is rare, although massive embolization with critical occlusion of the pulmonary artery may result in almost immediate death, or in severe shock and signs of acute right sided heart failure

Clinical Findings

The clinical signs of pulmonary embolization are extremely varied, depending on whether it occurs alone or with *infarction* (Short, 1952, Wolff, 1952, Fowler and Ballinger, 1954, Wright and Foley, 1955, Krause and Silverblatt, 1955) Many episodes actually are asymptomatic Dyspnea is probably the most common complaint Chest pain, which may be pleuritic or substernal *in nature*, is the initial symptom in about one third of the patients Anxiety, restlessness, sweating fever, and tachycardia may also appear initially Cough, hemoptysis and cyanosis usually focus the physician's attention on the lungs

If the [illegible] collapse, cyan[illegible] findings in the chest will vary Large infarcts produce signs of consolidation increased vocal fremitus, dullness to percussion, and bronchial breathing In addition, inspiratory rales and a friction rub may be heard With small infarcts, only decreased breath sounds and scattered rales can be detected Evidence of pleural fluid is frequently found instead of consolidation, or in association with it In many cases no abnormalities are *noted* on examination of the chest

Careful inspection of the legs for evidence of thrombophlebitis is most important when a diagnosis of pulmonary embolization is being considered Tenderness, heat, redness, and swelling of the leg especially along the course of a *vein* or in the calf, suggest venous disease Homans' sign (1939) and pain produced by the in-

flation of a sphygmomanometer about the calf (Lowenberg 1954) are special tests which aid in the diagnosis It is most important to suspect the diagnosis in a potential candidate for embolization and observe him closely and frequently.

Leukocytosis and elevation of the sedimentation rate are common The serum bilirubin level is frequently increased The serum transaminase level (SGO-T) may be elevated late in the illness, in myocardial infarction, on the other hand, the increase is observed early The roentgenographic findings are varied, and may be negative (Short, 1951). Within the first 12 hours an area of increased radiolucency may be seen After this, the involved area shows an increase in density, usually wedge-shaped or triangular There may be evidence of fluid, elevation of the homolateral leaf of the diaphragm, and prominent pulmonary vasculature Linear, platelike densities may persist for long periods Cavitation can occur (Soucheray and O'Loughlin, 1953) When fluid is present, thoracentesis frequently demonstrates a serosanguineous or bloody pleural effusion Evaluated with the rest of the clinical picture, this finding is most helpful in establishing the diagnosis The electrocardiogram shows a variety of changes, including the S1-Q3 pattern, depression of the S1, S2, S3, and ST segments, right axis deviation, flattening or inversion of T waves in 2, 3, and precordial leads, peaked P waves, and the appearance of right-sided conduction delay Arrhythmias are frequently observed

Pulmonary embolism is most often confused with pneumonia and myocardial infarction In the elderly patient, recurrent pulmonary embolization occurring without signs or symptoms may be responsible for intractable heart failure Recurrent embolization occasionally leads to chronic cor pulmonale, which progresses to congestive heart failure

Treatment

Acute, massive embolization allows little time for treatment, because death is often sudden The patient who does not die within a few minutes usually has severe anxiety, evidences of shock, and respiratory failure Demerol is indicated to allay apprehension, oxygen to reduce hypoxemia, and norepinephrine to maintain blood pressure. Digitalis may be beneficial when intrinsic heart disease

is responsible for associated failure Antibiotic therapy to prevent infection is advised by some authors

It is now generally agreed that anticoagulation therapy should be instituted in an attempt to prevent further embolization (Marks, *et al*, 1954, DeLaughter and Anlyan, 1956, Olwin, *et al*, 1958, Hunter, 1955) In the immediate postembolic period, heparin is the preferred anticoagulant For prolonged anticoagulation therapy in an ambulatory patient, one of the coumarin compounds is preferable If the patient has a past history of bleeding particularly from the gastrointestinal tract, or if anticoagulants do not increase the clotting time sufficiently it is necessary to consider ligation of the vena cava This is an effective means for preventing embolization from the lower half of the body (Madden 1954, Bowers, 1956) Early ambulation the use of elastic stockings, and passive exercise or massage of the leg appear to be indicated to prevent venous thromboses although clinical evaluations of these measures have been disappointing

TUMORS

Bronchogenic Carcinoma

Carcinoma of the bronchus occurs as frequently as cancer of the prostate or stomach Approximately 80 per cent of primary tumors of the lung are found in patients between the ages of 40 and 70 years men being affected much more often than women The extension of the average life span and the control of many acute illnesses help to explain the increased number of bronchogenic carcinomas diagnosed in recent years, but it is generally agreed that a substantial increase has taken place It also has been found that the death rate from lung cancer in older patients is increasing (Hammond and Mackle 1956)

Several types of bronchogenic carcinoma are observed Most frequent is the squamous cell tumor which develops primarily in large bronchi and metastasizes more slowly than others Second is the undifferentiated or anaplastic type which is usually very malignant Least frequent is the adenocarcinoma, which occurs in smaller bronchi and metastasizes rapidly Studies on the incidence of carcinoma in groups classified by age, sex, habits, and occupation have

provided some interesting theories as to the cause of bronchogenic carcinoma. At the present time, excessive cigarette smoking, inhalation of air polluted with industrial gases, and possibly inhalation of radioactive materials are suspected as causative agents (Hammond and Machle, 1956).

Clinical Findings. Unfortunately, there are no very early symptoms of bronchogenic carcinoma, and the first symptoms to appear are often minor and difficult to interpret (Albritten, *et al*, 1952; Farber, 1954). The patient's first complaints are usually nonspecific: slight cough, a localized audible wheeze, or deep, dull chest pain. The cough, which is dry and hacking or only moderately productive, is so common a symptom that it is often ignored by the physician. Next to cough, the most frequent initial symptom is deep chest pain and discomfort. Expectoration of mucoid material can occur, but usually the sputum contains pus or blood. Blood streaking or frank hemoptysis is an infrequent initial symptom, but is likely to occur at some time in the course of the disease.

Dyspnea is a common complaint in the elderly patient. Unresolved or recurrent pneumonia, which partially responds to antibiotic therapy, is difficult to evaluate; in the older age group, however, airway obstruction by a tumor should be strongly suspected. It is estimated that one fourth of the lung abscesses observed in men are due to bronchogenic carcinoma. It is not unusual, in the older age group, for the obstructive symptoms produced by lung cancer to be regarded as asthma. When the wheezing is limited to one section of the lung, however, some type of airway obstruction should be strongly suspected.

Certain general or systemic symptoms occur in bronchogenic carcinoma, as in other types of cancer. Arthritis, clubbed digits, and osteoarthropathy commonly occur at some stage of the disease, and occasionally are the initial symptoms (Vogl, *et al.*, 1955). Other general manifestations are anorexia, fatigue, weakness, night sweats, apprehension, and myalgia. It is of interest that neurologic symptoms unassociated with metastasis also occur early; these include neuropathy, myopathy, and cerebellar degeneration. As the disease progresses, local invasion, infection, or metastasis alters the clinical picture and symptomatology.

Examination of the chest may reveal no findings related to the tumor. The usual positive findings are due to local airway obstruc-

tion consolidation and pneumonia, abscess formation, or pleural fluid Pulmonary osteoarthropathy or evidence of metastatic tumor may direct attention to the lungs Extension of tumor to adjacent thoracic structures may cause Horner's syndrome, vocal cord paralysis superior vena cava syndrome dysphagia pleural effusion, cardiac involvement, or phrenic paralysis Extrathoracic metastases are found most commonly in the brain, kidney, bone, and liver

Leukocytosis is common with infection, and anemia is often present in advanced carcinoma An elevated alkaline phosphatase is suggestive of metastasis to liver or bone

The first indication of tumor is frequently the finding of a lesion on a routine chest film When bronchogenic carcinoma is suspected, the roentgenogram is most important as an aid to diagnosis A dense circumscribed lesion near the hilum is most suggestive of carcinoma Areas of pneumonia, atelectasis, or abscess may be seen Any solitary, well defined lesion in the lungs of an older patient should be considered a possible cancer More complete radiologic examination of the body is required to detect metastasis Bronchography and angiocardiography are sometimes useful in evaluating a suspicious lesion Laminagraphy has proved valuable in diagnosis and evaluation for surgery

Since approximately one half of the bronchogenic carcinomas are located in the first 4 to 6 cm of the main bronchi, bronchoscopy is mandatory in patients suspected of having this disease In addition to obtaining biopsy material bronchoscopy can yield information concerning operability of the cancer Papanicolaou studies of bronchoscopic washings and of fresh sputum properly prepared have proved useful in the hands of expert cytologists (Farber, *et al*, 1950) Aspiration biopsy of the lung is not advisable, but aspiration or surgical biopsy of metastatic lesions in the neck supraclavicular area bones or subcutaneous tissue may establish the diagnosis without thoracotomy When pleural fluid is present, needle biopsy of the pleura and study of cells in the fluid may make the diagnosis and prove that the tumor is inoperable

TREATMENT Treatment of bronchogenic carcinoma includes surgical medical and radiologic measures The fundamental concept of surgical treatment is the excision of all neoplastic tissue and the indication for surgery is the known or suspected presence of tumor without extrathoracic metastasis or extensive intrathoracic

provided some interesting theories as to the cause of bronchogenic carcinoma At the present time, excessive cigarette smoking inhalation of air polluted with industrial gases, and possibly inhalation of radioactive materials are suspected as causative agents (Hammond and Machle, 1956)

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but is supported in large part on the walls of the alveoli It often causes dyspnea and is characteristically associated with the profuse expectoration of mucoid sputum In about half the cases both lungs are involved The chest film shows single or multiple peripheral areas of increased density not unlike tuberculosis or metastatic car cinoma. Treatment is disappointing except when a single peripheral nodule is found and removed Neither radiation nor nitrogen mus tard affords much palliation when the tumor is disseminated

Sarcoma lymphoma and *Hodgkin s disease* are examples of other malignant diseases that involve the lungs *Pulmonary metastases* from tumors elsewhere in the body occur more frequently than primary lung cancer These usually appear as multiple round, pe ripheral masses but occasionally the metastasis—particularly if it is from a melanoma or hypernephroma—may be a large, isolated mass Surgical excision of such a single metastatic lesion may be life saving Metastatic tumors can involve the bronchus and are sometimes mistaken for primary bronchogenic carcinoma

Lastly benign tumors *adenomas papillomas fibromas lipomas chondromas* and *osteomas* can occur in elderly patients Symptoms may consist of cough hemoptysis or local airway obstruction Roentgen study may show a lesion that cannot be differentiated from malignant tumor It is important that a tissue diagnosis be made in all cases of suspected lung cancer If the tumor proves to be benign surgical excision may be very successful in relieving the symptoms produced by bronchial obstruction

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invasion. Anesthetic and surgical techniques now permit surgery in many elderly patients in whom thoracotomy would not previously have been considered. Factors to be evaluated in each individual patient are general pulmonary function and associated cardiopulmonary disease. Most reports indicate that less than half the patients in all age groups are considered for operation, and only a portion of these have resections. Both pneumonectomy and lobectomy are done, and the recent tendency has been to limit the procedure to lobectomy if the tumor can be removed. The over-all incidence of five-year survivals ranges from 5 to 10 per cent (Maier, 1956) Palliative resection may be indicated when a large, necrotic tumor, repeated pulmonary hemorrhage, or severe infection is present.

Radiotherapy assumes major importance in the large group of patients whose tumors cannot be removed by resection The newer techniques now permit radiation therapy as a palliative measure to decrease tumor size, especially when symptoms are produced by pressure or obstruction to the airway or superior vena cava. Radioactive materials, particularly radioactive gold, have been used interstitially, endobronchially, and intrapleurally. Lastly, nitrogen mustard and steroids have been employed as palliative measures Certainly, some type of chemotherapy offers our best hope for the future management of lung cancer, as well as cancer in general

Since 90 per cent of patients with lung cancer are incurable, medical management by the family physician becomes most important. Recurrent infection is treated with appropriate antibiotics and supportive measures, which have been discussed in the sections on pneumonia and lung abscess. Pleural effusions require frequent aspiration, the instillation of nitrogen mustard or radioactive gold may help prevent their recurrence Cough is often helped by the measures discussed in the section on bronchitis Pain requires narcotics, sedation, and tranquilizing drugs Every effort should be made to help the patient live out his short life span comfortably and productively.

Other Tumors

Bronchiolar or alveolar cell carcinoma occurs in 1 5 per cent of all patients with lung cancer. This tumor arises from the bronchiole,

but is supported in large part on the walls of the alveoli It often causes dyspnea and is characteristically associated with the profuse expectoration of mucoid sputum In about half the cases both lungs are involved The chest film shows single or multiple peripheral areas of increased density not unlike tuberculosis or metastatic carcinoma. Treatment is disappointing except when a single peripheral nodule is found and removed Neither radiation nor nitrogen mustard affords much palliation when the tumor is disseminated

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CHAPTER 17

Disorders of the Gastrointestinal Tract and Digestive Organs

DAVID CAYER

THE ESOPHAGUS

The rhythmic, uninterrupted passage of food through the esophagus may be disturbed by diseases such as cancer and scleroderma, as well as by emotional factors Disorders of the central nervous system can affect the esophageal innervation, involve the myenteric plexus and produce muscular changes

Achalasia

Although achalasia usually begins in early life, a Mayo Clinic report on 55 patients requiring surgery for this condition indicated that 19 were over the age of 50 In achalasia the cells of the *myenteric* plexus undergo degeneration The result is inadequate and ineffective esophageal muscular contraction, and associated failure of the lower esophagus to relax when swallowing is initiated As a result the lower part of the esophagus becomes *narrowed*, while the upper portion is dilated by the increasing difficulty of *forcing* its contents through the contracted sphincter

DIAGNOSIS The most frequent symptom is dysphagia aggravated by solid foods and excessively cold liquids Regurgitation is frequent and may occur hours after eating In severe instances the absence of acid allows fermentation to occur, giving the material a characteristic appearance Esophagitis and ulceration may develop

when food remains in the esophagus for long periods Weight loss is common, but pain and hemorrhage are infrequent The diagnosis is made from the clinical features, roentgen examination, endoscopy, or with the aid of balloon studies of esophageal motility

Roentgen studies with barium reveal the characteristic dilatation of the upper portion of the esophagus, and disturbed motility When Mecholyl is administered as a diagnostic test, the characteristic pressure response produces such marked contraction that the esophagus frequently evacuates its contents Endoscopy is valuable in ruling out complications or associated diseases such as carcinoma Malignancies originating in the fundus of the stomach and extending into the lower esophageal segment may produce a roentgen appearance similar to that of achalasia In uncomplicated achalasia, the esophagoscope can be introduced into the stomach, and no constriction is demonstrable

TREATMENT There is no medical treatment that restores the normal tone of the esophagus and at the same time provides relaxation at the esophagogastric junction Hydrostatic dilatation will afford marked and permanent relief in as many as 60 per cent of the patients Even when symptoms recur, dilatation sufficient to overcome the resistance of the inferior esophageal muscle fibers usually provides relief for as long as 6 months In more severe cases a high incidence of satisfactory results has been reported following extramucosal esophagocardiomyotomy Surgery should be considered for patients who fail to respond to repeated adequate dilatations

Hiatal Hernia (Diaphragmatic Hernia)

Most cases of hiatus hernia occur in patients beyond the age of 50 (Fig 17-1) Etiologic factors include increased intra abdominal pressure, obesity ascites and trauma Forty per cent of the patients are at least 10 per cent overweight Traumatic hiatus hernias most commonly follow stab wounds or crushing injuries such as automobile accidents often inflict

Gould and Barnhard (1957) divide hiatal hernias into four types (1) congenital short esophagus, (2) sliding hernia, (3) paraesophageal hernia, and (4) combined sliding and paraesophageal hernia The types of hernias usually cannot be distinguished

clinically The most common and clinically important type is the sliding hiatal hernia produced by incompetence of the hiatus secondary to muscle weakness and increasing abdominal pressure



FIG 17 1 Hiatal *hernia and duodenal ulcer* The patient was a 76-ye
in a hiatal h
the level of
bulb is elongated and shows a large *duodenal ulcer (arrow)*

The cardiac end of the stomach is involved most frequently, although occasionally a large part of *the* stomach or even of the omentum may be included in the hernial sac In this type the stomach becomes herniated into the chest This herniation occurs more frequently on the left, since the right side is protected by the dome

of the right lobe of the liver The hernia usually extends into the posterior mediastinum Recurring esophagitis with resulting fibrosis or nervous irritability results in contraction and acquired shortening of the esophagus Many of the clinical manifestations are related to this secondary esophagitis

In rare cases hiatal hernia results from congenital shortening of the esophagus, with development of the stomach in the thorax In patients with a congenital short esophagus the thoracic stomach is supplied by branches of the thoracic aorta, in patients with the acquired type of esophageal shortening the circulation is derived from the left gastric artery

In the paraesophageal hernia the lower end of the esophagus *remains in its normal position, and the cardia of the stomach herniates laterally through the opening into the thorax*

DIAGNOSIS The clinical picture is variable One patient in ten will have pain, usually beneath the sternum or high in the epigastrium, which is apt to be worse after heavy meals It is aggravated by reclining, stooping, or bending, and is occasionally relieved by resuming the upright position or stretching The pain may come on at rest, frequently at night when gastric acidity is high and the pa*tient is reclining* The pain and sensation of pressure occasionally *radiate into the left side of the chest* and down into the shoulder and arm, simulating angina In such cases one must rule out coronary insufficiency and myocardial infarction Occasionally hiatus hernia seems to precipitate a true anginal attack Other symptoms frequently produced by hiatal hernia are fullness, belching and dysphagia with associated regurgitation Occasionally anemia may occur without hematemesis or melena, in such cases occult blood can be demonstrated in the stool

The symptoms of esophageal hernia may mimic carcinoma of the stomach or coronary artery disease, and in fact the condition may be complicated by one of these diseases The differential diagnosis may be difficult when a concomitant electrocardiographic abnormality or disease elsewhere in the digestive tract is demonstrated *When the differential diagnosis lies between esophageal hernia and* cardiac disease, a balloon may be introduced under fluoroscopy into the lower part of the esophagus and distended with 60 cc of air If the patient's symptoms are reproduced by this maneuver, it may

be assumed that they are gastrointestinal in origin Pain radiating into both shoulders or jaws is invariably cardiac

It is important to recognize that in about 20 per cent of the cases hiatal hernias are asymptomatic and are discovered by accident on routine barium examinations of the upper digestive tract Such hernias require no therapy Another 20 per cent of the cases are associated with cholecystitis peptic ulcer, or diverticulosis of the colon

Other esophageal abnormalities such as diverticula cardiospasm and carcinoma usually can be differentiated by careful roentgen studies which may often be facilitated by the use of the Trendelenburg position and other procedures that increase abdominal pressure All patients having esophageal symptoms and negative roentgenograms should have an esophagoscopic study This procedure is also of value in demonstrating the presence or absence of esophagitis in cases of hiatus hernia

TREATMENT Medical treatment is directed principally toward decreasing abdominal pressure Patients who are overweight should be put on a reduction diet tight abdominal binders or clothing should be eliminated and lifting and straining should be avoided The patient should be instructed to masticate carefully and eat more slowly to remain upright for one to two hours after meals and in some cases to elevate the head of the bed on 4 inch blocks or to sleep on several pillows A modified peptic ulcer regimen including antacids between meals avoidance of stimulants and the use of antispasmodics and sedatives may be helpful When esophagitis is present inflammation may progress to actual ulcer formation with subsequent fibrosis stenosis and shortening In such cases mechanical esophageal dilatation may be required Other possible complications of esophagitis are hemorrhage and perforation When ulceration of the esophagus persists in spite of medical management simple phrenic crush may provide enough symptomatic improvement to make additional operative treatment unnecessary More drastic surgery is rarely required except in cases of incarceration or hemorrhage that cannot be controlled by *other* means Occasionally however reduction of the hernia and reinforcement of the hiatal sling may be necessary to restore the competency of the extrinsic and intrinsic sphincter mechanisms

Benign Tumors

Benign tumors of the esophagus are rare The most common are leiomyomas and polyps They tend to develop in the lower third of the esophagus, and produce symptoms of obstruction and dysphagia. The extraluminal tumors may not involve the mucosa, and may be missed on esophagoscopic examination While benign tumors may not produce symptoms sufficient to justify extensive surgery, their removal may be necessary for a definitive diagnosis The mortality is not high in cases where a simple excision can be performed

Cancer

Cancer of the esophagus (Fig 17-2) is responsible for approximately 2 per cent of all deaths from cancer It is relatively uncommon before the age of 50, but constitutes a major problem in geriatric medicine because of its high incidence in the seventh and eighth decades It occurs five times as frequently in men as in women

Esophageal carcinomas are predominantly squamous cell or epidermoid The epidermoid carcinoma of the middle and upper portions of the esophagus usually grows and disseminates more rapidly Lesions in the distal third may be adenocarcinomas, which, in this location, usually grow more slowly than do epidermoid carcinomas Esophageal cancers of all types may be associated with ulceration, direct extension into surrounding structures, stenosis, stricture, and even fistulous communications with bronchi

DIAGNOSIS The earliest symptom produced by lesions in the upper third of the esophagus is usually hoarseness or cough Dysphagia, substernal oppression, symptoms of obstruction, and weight loss soon follow, irrespective of the area involved, bringing the patient to the physician some five to seven months after the onset of symptoms The disease is usually advanced before symptoms appear

Most esophageal cancers can be defined by barium studies, although certain benign lesions of the esophagus may simulate carcinoma and mislead experienced radiologists and surgeons Similar symptoms and findings may also be produced by diverticula of the



Fig 17-2 Esophageal cancer (*Top*) Squamous cell carcinoma (*arrow*) of the middle third of the esophagus in a 67 year-old woman (*Bottom*) A roentgenogram made after resection of the lesion and esophagogastric anastomosis at the level of the left clavicle The patient remained comfortable and maintained her weight until her death three years later of metastatic tumor

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esophagus, cardiospasm, extrinsic pressure, benign tumors non specific esophagitis with stricture formation, or simple esophageal spasm With cardiospasm, marked dilatation of the esophagus occurs and the obstruction is at the esophagogastric junction The differential diagnosis of this condition can usually be made by the characteristic findings on roentgen and esophagoscopic examination, and by the response to dilatation Occasionally carcinoma and cardiospasm occur simultaneously With strictures following peptic ulcer or esophagitis, dilatation is less pronounced and the contractile activity of the esophagus is not lost Re-examination and esophagoscopy after the patient has been kept at rest, given sedatives, and limited to a fortified liquid diet for three to five days may be of additional help in delineating the problem

TREATMENT The usual surgical procedure in cases of esophageal cancer is resection and esophagogastrostomy Because of the inaccessibility of the lesions and the magnitude of the operation the mortality in elderly patients is excessively high The nutritional disturbances frequently found in patients of this advanced age add to the operative risk Postoperative pulmonary complications and postprandial symptoms are common, and ulceration of the remaining esophagus, followed by stricture formation and recurring malignancy with obstruction, may occur Cure is rare, even when the condition of the patient and the appearance of the lesion justify extensive surgery Advances made in thoracic surgery during the past decade, however, offer some hope of cure for localized lesions favorably situated

Where cure is not possible, palliation can often be provided by roentgen therapy and less radical procedures designed to prevent obstruction Occasionally mechanical dilatation of the esophagus may give symptomatic relief for months In patients who have dysphagia and obstruction before the lumen has been completely obliterated, a polyethylene tube carefully passed into the stomach may permit maintenance of nutrition and prolonged physical usefulness

Esophageal Varices (See Cirrhosis)

Esophageal varices are most common in the lower third of the esophagus, and are usually the result of cirrhosis Occasionally they

may be secondary to extrahepatic lesions such as obliterative dis ease of the portal vein or veins of the portal system They produce few symptoms and the principal danger is that of hemorrhage

If the varicosities are large enough and the roentgenologist uses barium of the proper consistency and specialized techniques (in cluding measures designed to increase intra abdominal pressure), the diagnosis may be made by roentgen study in 50 to 65 per cent of the cases

Esophageal Diverticula

The symptoms produced by esophageal diverticula are related to the areas in which they occur Diverticula in the lower portion when they become large enough to retain food may compress the esophagus and produce obstructive symptoms similar to those caused by other lower esophageal lesions Many esophageal di verticula are asymptomatic and do not cause obstruction interfere with nutrition or produce weight loss In such cases no treatment is required Most patients however will have to be careful to avoid foods that are coarse or improperly chewed Many patients learn to empty the diverticulum themselves by drinking liquids reclining or lowering the head

THE STOMACH AND DUODENUM

Gastritis

Gastritis or inflammation of the stomach may be acute or chronic It is usually due to infections or to irritants the most com mon being condiments *alcohol* drugs such as salicylates and digi talis and corrosive substances ingested inadvertently or with sui cidal intent Emotional disturbances by altering the circulation or increasing gastric secretion may also predispose to the develop ment of gastritis

Gastritis is usually classified according to the gastroscopic find ings into superficial atrophic and hypertrophic types The super *ficial* form is characterized by hyperemia edema erosions and scattered patches of adherent mucus *Atrophic* gastritis is a chronic inflammatory disorder leading to destruction of gastric glands On

esophagus, cardiospasm, extrinsic pressure, benign tumors, non specific esophagitis with stricture formation, or simple esophageal spasm With cardiospasm, marked dilatation of the esophagus occurs and the obstruction is at the esophagogastric junction The differential diagnosis of this condition can usually be made by the characteristic findings on roentgen and esophagoscopic examination, and by the response to dilatation Occasionally carcinoma and cardiospasm occur simultaneously With strictures following peptic ulcer or esophagitis, dilatation is less pronounced and the contractile activity of the esophagus is not lost Re-examination and esophagoscopy after the patient has been kept at rest, given sedatives, and limited to a fortified liquid diet for three to five days may be of additional help in delineating the problem

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The symptoms vary according to the individual threshold for pain and the intensity of the precipitating factor. As a rule the symptoms are nonspecific and consist of epigastric burning, fullness, nausea, and vomiting. Occasionally they simulate peptic ulcer. Nausea and pain before breakfast are said to be characteristic of



Fig 17.4 Atrophic gastritis In this 69 year old woman with achlorhydria the stomach is decreased in size and peristalsis is almost completely absent The rugal folds appear thinned out and obliterated in areas

alcoholic gastritis The symptoms are frequently precipitated or aggravated by the ingestion of condiments, fried foods, alcohol, coffee, or fruit juices, and are often worse during periods of emotional stress Hemorrhage of varying severity may occur in all types of gastritis Diarrhea, or alternating diarrhea and constipation, is probably more frequent with the atrophic type.

gastroscopy, the mucous membrane appears thin and pale green, branching vessels are visible throughout the mucosa The atrophic gastritis of pernicious anemia has few of the inflammatory features noted in other forms of gastritis. In chronic *hypertrophic* gastritis



Fig 17-3 Hypertrophic gastritis The gastric rugae appear markedly widened and irregular The pyloric canal is elongated, and umbilication at the base of the duodenal bulb has been produced by protrusion of gastric mucosa

(Fig 17-3), gastroscopy shows hyperplastic, erythematous folds and thickening of the mucous membrane, which has a "cobblestone," nodular, or velvety appearance; occasionally hemorrhages or small ulcerations may be seen.

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DIAGNOSIS An accurate and definitive diagnosis can be made only by gastroscopic observation Physical findings are usually absent, or limited to mild or moderate epigastric tenderness In the superficial or hypertrophic type of gastritis, gastric analysis usually reveals hyperchlorhydria In the atrophic variety (Fig 17-4) there is hypochlorhydria or achlorhydria

Roentgen studies of the upper digestive tract should always precede gastroscopy, although the findings are usually negative or nonspecific Prominent gastric folds will occasionally be noted in the hypertrophic type In the atrophic variety the mucosal pattern is often smooth Irritability and irregularities may be seen Ulcerations, even though they may bleed severely and produce pain, are too superficial to retain barium, and hence are not visualized

TREATMENT Therapy consists in eliminating all irritating agents and prescribing a regimen similar to that used in the management of peptic ulcer Treatment may produce symptomatic relief without altering the gastroscopic picture Atrophic gastritis, even when it is associated with pernicious anemia, does not respond to liver or vitamin therapy

Gastric Atrophy

Gastric atrophy is usually considered as the end result of atrophic gastritis, and the gastroscopic appearance of the mucosa is similar in the two conditions The signs and symptoms of gastric atrophy are also similar to those of gastritis, with the addition of anorexia, weight loss, pallor, and anemia

The tendency to gastric atrophy appears to be hereditary and perhaps conditioned by nutritional deficiencies or metabolic disturbances The majority of patients have achlorhydria Gastric ulcer is frequently associated with atrophic lesions in the mucosa Polyposis also is closely related to gastric atrophy, and often follows it

Roentgen examination in cases of gastric atrophy shows smoothing out of the gastric rugae, which is suggestive of the diagnosis For a more accurate diagnosis, gastroscopy and biopsy of the gastric mucosa are necessary

In some stages, gastric atrophy may be arrested or reversed Treatment is generally the same as that advised for uncomplicated

peptic ulcer When the diagnosis of pernicious anemia is made by appropriate studies specific therapy for this condition is indicated even though it will not cause reversion of the associated gastric atrophy

Peptic Ulcer

The magnitude of the ulcer problem is indicated in some measure by the estimate that 10 per cent of the population of this country will at some time have an active peptic ulcer Duodenal ulcer occurs approximately four times as often in men as in women for gastric ulcer the ratio is about three males to one female Collected data indicate that more than 10 per cent of the patients with peptic ulcer are over 60 years of age One fourth to one half of these had their first symptoms after the age of 50

ETIOLOGY Peptic ulcer (Fig 17 5) results from the inability of the mucosa to withstand the corrosive action of acid gastric juice It develops only in those areas of the gastrointestinal tract exposed to such acid Gastric ulcers are usually associated with *normal* or low gastric acidity duodenal ulcers with hyperacidity which is probably related to vagal hyperactivity The pathogenetic factors leading to decreased tissue resistance remain unknown Factors of mucosal protection integrity and healing undoubtedly play a part

Numerous *drugs have* been shown experimentally to be ulcerogenic and demonstrated clinically to have deleterious effects in ulcer prone patients These preparations include histamine caffeine reserpine, salicylates Butazolidin quinidine and anticoagulants Apparently they stimulate the *secretion of* hydrochloric acid by direct irritative and corrosive phenomena or in some cases by hormonal mechanisms and other means not well understood Numerous documented reports in the literature also indicate that the administration of corticotropin and cortisone may produce ulcers in some susceptible *individuals* and reactivate quiescent ulcers in others The incidence of ulcer formation in patients receiving short *term* or long term therapy with adrenal hormones has been reported as 1 to 5 *per cent* Such lesions respond symptomatically to routine ulcer management A history of pre-existing ulcer is not a contraindication to the administration of steroids where a

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definite need exists although antiulcer therapy should be given concomitantly to patients with such a history

TREATMENT

Diet There is no evidence that an inadequate diet precipitates the development of ulcer or that any special dietary regimen will provide a permanent cure In the absence of complications such as obstruction or postresection feeding problems special dietary factors such as accessory vitamins or minerals are rarely necessary Patients with uncomplicated ulcer can obtain symptomatic relief with relatively simple dietary measures A bland nonstimulating diet containing no mechanical or chemical irritants and designed to neutralize and [illegible]

Stimular [illegible]

hot, carl [illegible]

be pureed The diet should provide adequate calories and nutrients It should include milk eggs cooked cereal enriched bread fish or meat that is well cooked (broiled boiled or roasted) pureed vegetables and simple desserts

Initially six small feedings during the day with milk and an antacid at bedtime and once or twice during the night may be necessary to relieve pain As soon as discomfort has subsided the patient may have his diet in three meals with milk and an antacid between meals and at bedtime Foods must be well cooked and well chewed Citrus fruit and fruit juices are poorly tolerated by approximately half the patients with ulcer Accessory vitamins are rarely indicated since response to therapy is usually rapid allowing the patient to take a full and adequate diet within a relatively brief time

Rest Psychic and physical rest is an important part of an ulcer regimen Hospitalization while preferable is not always mandatory or feasible The importance of a change in environment at the beginning of therapy is well recognized and an initial period of hospitalization provides this change as well as an opportunity for indoctrination and [illegible]

tients [illegible] 'fany pa

more [illegible] become

[illegible] and anxious when they are not permitted to carry on some of their routine activities The home environment and the individual's financial and occupational circum



Fig 17-5 Multiple benign peptic ulcers (*Top*) Spot film showing a clover leaf deformity of the duodenal bulb (*Bottom*) In the same patient a benign penetrating ulcer on the lesser curvature The gastric lesion healed with medical treatment

is particularly important in patients with cerebral arteriosclerosis Tranquilizers add to the expense of therapy, and are rarely indicated

The increased secretion of hydrochloric acid and gastric motility that may follow anxiety, tension, or excess physical fatigue emphasize the need for regulating the individual's daily routine within his physical and emotional limitations Although the effect of emotion on gastric circulation motility, and secretion has been noted by many and can be measured objectively, intensive psychotherapy is rarely necessary or justified Most patients with ulcers are best treated by an understanding sympathetic internist or family physician

Antacids Since benign peptic ulcer does not occur in patients with permanent achlorhydria and since most patients with peptic ulcers have normal or hyperacid gastric secretions, the relation between ulcer and acid appears to be a real one Although no definite correlation has been demonstrated between the degree of acidity and the amount of pain or the recurrence of ulcer symptoms, the symptomatic relief provided by antacids has made them a cornerstone in the management of active peptic ulcer It is best to give antacid preparations at the time in the digestive cycle when pain habitually occurs usually one to two hours after meals, at bedtime, and with night feedings when necessary The buffering effect of food can usually be relied upon in the intervals

Although a pH of 5 is necessary for complete inactivation of pepsin peptic activity is most pronounced at pH 1 5 to 2 5 Rapid neutralization of the gastric secretion to a pH of 3 5 relieves ulcer pain and this level is generally considered optimal for antac[illegible] therapy In [illegible]

[illegible] a satisfactory colloidal suspension The chief advantage of tablets is the ease with which they can be carried about and taken

Antacids and antacid mixtures in variety in both tablet and liquid form are available and are successful to varying degrees in relieving discomfort Calcium carbonate in doses of 0 5 to 1 0 Gm is potent and effective, but calcium salts tend to precipitate and produce constipation Magnesium oxide, 0 25 Gm., is a widely used

stances must be considered, particularly in elderly patients Ambulatory treatment may be permitted if conditions are satisfactory and the general regimen can be followed

Most patients with ulcer manifest apprehension and tension, and appear to be benefited by mild sedation Unless the patient is *hospitalized, the dosage should not be large enough to produce* drowsiness or interfere with efficiency Avoidance of oversedation

TABLE 17-1 BLAND DIET

Beverages	Milk milk and cream buttermilk strained fruit juices Postum *decaffeinated coffee*
Bread	White bread toasted, soda crackers, thin, well baked biscuits Zwieback
Butter or margarine	*As desired*
Cereal	Any refined cereal or strained cereal such as Cream of Wheat Farina strained oatmeal *or* any of the following prepared cereals Post Toasties Cornflakes, Rice Toasties Rice Krispies Puffed Rice *Cheerios Kix, macaroni spaghetti noodles rice and grits*
Cheese	Cottage cheese cream cheese or mild yellow cheese if used in a sauce or in cooking
Desserts	Baked or boiled custard tapioca pudding rice pudding plain Jelly or *Jello made with any of the fruit allowed fruit whips* vanilla ice cream sponge cake angel food cake or plain white cake Cakes may have a plain icing Vanilla wafers or vanilla cookies that contain no nuts raisins coconut or candied fruits
Eggs	Prepared any way except *fried*
Fruits	Any strained fruit or tolerated fruit juices canned peaches pears apricots without skins apple juice plums prunes rhubarb Royal Anne cherries ripe raw bananas baked bananas baked apples without skins
Meats and fish	Crisp bacon very tender well-cooked beef veal lamb liver or chicken baked or creamed white fish salmon tuna and oysters stewed or creamed Meat should be boiled baked or stewed DO NOT FRY
Soups	Creamed soups as desired strained
Vegetables	Any of the following tender well-cooked vegetables seasoned with butter milk or cream asparagus tips immature English peas very tender green beans squash carrots baby lima beans immature beets sweet and Irish potatoes
Avoid	Cabbage onions peppers radishes and turnips meat soups and gravy corned beef frankfurters smoked meat or smoked fish and sausage hot bread pastries nuts and olives

Special instructions

1 Salt may be used in moderation All other condiments should be avoided
2 Fruit juice is best taken after a meal
3 Avoid all fried foods gravies chocolate alcohol and soft drinks
4 Take time eat slowly and chew well Do not wash food down
5 Coffee tea and cigarettes according to doctor s orders

is particularly important in patients with cerebral arteriosclerosis Tranquilizers add to the expense of therapy, and are rarely indicated

The increased secretion of hydrochloric acid and gastric motility that may follow anxiety, tension, or excess physical fatigue emphasize the need for regulating the individual's daily routine within his physical and emotional limitations Although the effect of emotion on gastric circulation motility, and secretion has been noted by many and can be measured objectively, intensive psychotherapy is rarely necessary or justified Most patients with ulcers are best treated by an understanding, sympathetic internist or family physician

Antacids Since benign peptic ulcer does not occur in patients with permanent achlorhydria and since most patients with peptic ulcers have normal or hyperacid gastric secretions the relation between ulcer and acid appears to be a real one Although no definite correlation has been demonstrated between the degree of acidity and the amount of pain or the recurrence of ulcer symptoms, the symptomatic relief provided by antacids has made them a cornerstone in the management of active peptic ulcer It is best to give antacid preparations at the time in the digestive cycle when pain habitually occurs usually one to two hours after meals, at bedtime, and with night feedings when necessary The buffering effect of ... als

... plete inactivation of pepsin peptic activity is most pronounced at pH 1 5 to 2 5 Rapid neutralization of the gastric secretion to a pH of 3 5 relieves ulcer pain and this level is generally considered optimal for antacid ... effect ... than ... mino acetate which rapidly forms a satisfactory colloidal suspension The chief advantage of tablets is the ease with which they can be carried about and taken

Antacids and antacid mixtures in variety in both tablet and liquid form are available, and are successful to varying degrees in relieving discomfort Calcium carbonate in doses of 0 5 to 1 0 Gm is potent and effective but calcium salts tend to precipitate and produce constipation Magnesium oxide, 0 25 Gm, is a widely used

nonsystemic antacid In some patients its continued use produces diarrhea The antacid properties of magnesium carbonate and magnesium oxide are similar Combinations of calcium carbonate and magnesium carbonate or magnesium carbonate and magnesium oxide tend to have a laxative effect Aluminum hydroxide in liquid form has an astringent action and causes some constipation A combination of aluminum hydroxide and magnesium trisilicate, given in doses of 8 to 16 cc, is effective and less constipating Mixtures of colloidal aluminum hydroxide and calcium carbonate or magnesium trisilicate are efficient in raising the gastric pH and relieving ulcer pain, the dosage is 1 to 2 teaspoons or 1 to 2 tablets between meals and at bedtime Sodium bicarbonate has a pronounced and rapid antacid effect, but because of the possibility of alkalosis and acid rebound it is rarely used except for short intervals in patients who are bleeding

When acidity cannot be controlled by simple measures, a constant intragastric drip utilizing milk and antacid mixtures according to the desired protein and fat content may be used throughout the day and night Up to 3,000 cc of milk mixed with 100 to 200 cc of antacid mixtures may be given over a 24 hour period Patients under moderate sedation usually do not complain of discomfort or lose sleep because of the nasal catheter

It should be emphasized that antacids may produce certain undesirable effects such as nausea and constipation, and occasionally may delay gastric emptying or produce alkalosis Some patients object to the chalky or flavored taste

Anticholinergic Drugs The neural control of gastric secretion is mediated primarily through the autonomic nervous system Anticholinergic drugs, by inhibiting vagal activity, decrease gastric motility and the secretion of acid Their effect on motility is greater, however Untoward side effects may make it impossible to give the effective dose, but such effects are less frequent and less severe with the newer preparations These drugs, by delaying gastric emptying, may have the added value of providing longer neutralization of acid by ingested food and concomitant antacid therapy

In patients hospitalized because of pain, the parenteral administration of anticholinergic compounds may be extremely effective,

affording rest and relief of discomfort and permitting a more rapid symptomatic response It is doubtful that the usual therapeutic doses can mask the manifestations of failure to heal or other serious complications Anticholinergic drugs can however cause headache blurred vision dryness of the mouth constipation tachycardia and urinary hesitancy They should not be used in patients with a history suggestive of cardiospasm pyloric obstruction glaucoma or prostatism

General Measures Resistance to ulcer is not increased by the administration of vitamins to patients manifesting no signs or symptoms of vitamin deficiency and as a rule can be improved only by sufficient rest an adequate diet and the elimination of gastric irritants

Limited smoking particularly after eating is probably not harmful Excessive smoking usually mirrors an increase in nervous tension and since it is often associated with a decreased food intake should be discouraged The patient may be allowed to take a mixed drink immediately before dinner provided it contains no more than 1 or 1½ ounces of whisky The increase in appetite relaxation and sense of well being is probably sufficient to offset any harmful effects from the increased secretion of hydrochloric acid

COMPLICATIONS

Hemorrhage The most common cause of melena is bleeding from a duodenal ulcer The prognosis is graver in patients over 45 particularly when melena is associated with hematemesis pain or additional complicating diseases such as generalized arteriosclerosis hypertension or diabetes All bleeding patients must be hospitalized and kept at complete bed rest A surgical consultant should be called immediately and adequate supplies of blood made available Adequate sedation may be provided with short acting barbiturates

If the patient is vomiting food should be temporarily withheld Intravenous isotonic saline or Ringer's solution may be given for a period of several hours until vomiting ceases and a diet can be given If the patient is not vomiting he should have hourly feedings of milk cream precooked cereals gelatin or custard during the day Such feedings may be alternated with milk and noncon

stipating antacids given every other hour If bleeding ceases the *feedings may be amplified gradually to the routine ulcer regimen*

The condition of most patients can be accurately and easily followed by determinations of the blood pressure and pulse every half hour until vital signs are normal Unless hemorrhage is continuous and massive, mild evidence of shock will usually subside promptly with the slow intravenous administration of 1,000 cc of hypertonic *glucose Immediate transfusion is usually not necessary unless the* hemoglobin is below 50 per cent (7 5 Gm) or the patient shows clinical signs indicating air hunger or angina When evidence of persistent bleeding is present, transfusions of 500 cc of whole blood should be given Failure of the circulation to stabilize on the above measures within a period of 48 to 72 hours—manifested by persistent or recurring tachycardia and hypotension—indicates uncontrolled bleeding In the majority of such instances, the risk of surgery is less than that of medical management

A drop in systolic pressure below 100 or elevation of the pulse rate above 120, with or without hematemesis or additional large, soft, tarry stools, is indicative of further hemorrhage When a patient whose bleeding has apparently been controlled for several days under adequate medical management has clinical evidence of another large hemorrhage, surgery should be performed as soon as shock can be controlled

Hemorrhage recurs months or years following surgery in 10 to 15 *per cent of the patients The incidence of recurrence is still higher* in patients who have had a hemorrhage managed by medical means alone

Acute Perforation Perforation of a peptic ulcer can usually be diagnosed without difficulty In most cases a past history of ulcer symptoms can be obtained Marked signs of peritoneal irritation develop, and free air beneath the diaphragm can be demonstrated by x-ray *When the diagnosis is made within one to four hours after* the onset of symptoms and the patient is in good condition, gastric resection rather than simple closure of the perforation should be performed When the diagnosis is questionable or adequate surgical facilities are not available, or when the diagnosis is delayed longer than 8 to 12 hours, treatment with constant gastric aspiration, antibiotics, and the parenteral administration of fluids, glu-

cose, and electrolytes, together with general supportive measures, usually results in highly satisfactory closure and healing

Gastric Retention Gastric retention is frequently produced by the edema and spasm associated with ulcer activity It often responds satisfactorily to 7 to 10 days of an adequate medical regimen After a one-day interval of limiting the diet to small amounts of milk or other acid neutralizing liquids, the degree of retention and its response to treatment can be evaluated by aspirating and measuring the gastric contents following a period of 2 to 6 hours without food or liquids (depending upon the degree of discomfort produced by fasting) A persistent gastric residue of more than 150 cc after the patient has had nothing by mouth for 6 hours indicates obstruction

Constant gastric suction through a nasal tube is useful for patients having a high degree of gastric retention or severe ulcer pain When this procedure produces a demonstrable decrease in retention over a 72 hour period, with disappearance of succussion splash and visible or palpable evidence of gastric dilatation, one may assume that the obstruction is due in part to edema associated with inflammation and often with atony, which follows unsuccessful efforts of the stomach to evacuate itself through the narrowed opening. In most such instances, marked improvement follows when the gastric contents are constantly neutralized or removed by suction and the stomach is lavaged nightly with sodium bicarbonate in warm *saline solution* (1 tablespoon per liter) With decreased inflammation and increased gastric tone, evacuation of the stomach becomes satisfactory in 5 to 7 days and normal physiologic gastric emptying can be demonstrated The diet can then be increased accordingly

When the residual gastric contents are not reduced by lavage, liquid feedings medication to relieve pylorospasm, and rest, it may be assumed that permanent organic obstruction exists and surgery is indicated

Unsatisfactory Response to Treatment Failure to show a prompt and satisfactory response to treatment may indicate (1) erroneous or multiple diagnoses (for example, associated gallbladder disease, irritable bowel, diverticulosis of the colon, or hiatal hernia), (2) a large chronic ulcer, (3) a walled off perforation, (4) pyloric ob-

struction, (5) associated gastritis, (6) an inadequate medical *regimen or (7) lack of co operation* The patient should be hospitalized for re evaluation and careful individualization of treatment

PREVENTION OF RECURRENCES The major problem in treating the ulcer patient is to prevent recurrences The likelihood of success depends to some degree on the willingness and ability of the patient to adhere to a routine of life minimizing psychic trauma, frustration, and uncontrolled extremes in emotion Long-term therapy should also include (1) a nonstimulating diet without excessive intervals between feedings, (2) routine seasonal counseling with re-evaluation of the patient and renewed emphasis on the principles of therapy, (3) education of the patient regarding (a) the known factors influencing the pathogenesis of ulcer and (b) living within his physical and emotional limitations, (4) prompt treatment of recurrences

It must be emphasized that many factors influencing mucosal integrity are not understood or controllable at the present time, and that the disease may recur in spite of excellent co operation on the part of the patient While simple, uncomplicated ulcer responds to treatment in a gratifying manner, recurrences and complications are not prevented by diet and the constant or prolonged administration of antacids and anticholinergic drugs

GASTRIC ULCER The differential diagnosis of gastric ulcer and *gastric cancer is discussed in the next section, if all diagnostic* facilities are available, it is highly accurate In general it may be stated that the majority of patients with gastric ulcers should receive medical therapy at the onset, since malignant degeneration of benign ulcers is uncommon, and intensive medical therapy will produce satisfactory results in a high percentage of cases One may anticipate that approximately half the patients with benign gastric ulcers treated medically will be symptom free for as long as five years, and another 20 per cent will be markedly improved The failure of a co operative patient to obtain relief from symptoms within a period of 5 to 7 days while hospitalized on an intensive regimen indicates (1) a complication of the ulcer, (2) the possibility that it is not benign, or (3) the presence of an unrecognized complicating disease

The belief of some surgeons and clinicians that operation is indi-

cated in all cases of gastric ulcer is unjustified The operative mortality associated with gastric resection is now only 1 to 2 per cent but the sequelae of gastric resection—anemia, persistent vomiting nutritional disturbances and diarrhea—present difficult problems in about 10 per cent of the patients Occasionally ulcer recurs after gastric resection The results of adequate medical therapy for benign gastric ulcer are sufficiently good to justify a trial on medical management, particularly in elderly patients for whom the risk of surgery is increased

Gastric Cancer

Cancer of the stomach (Fig 17 6) is a leading cause of death among all types of malignant diseases According to the Bureau of Vital Statistics 63 3 per cent of the deaths from gastric cancer in 1954 occurred in men Cancer of the stomach is most frequent in



FIG 17 6 Carcinoma of the stomach in a patient with a deformed duodenal bulb In this unusual case the roentgenogram reveals the presence of a deformed duodenal bulb (*bottom arrow*) At the time of operation the gastric lesion (*top arrow*) was found to be an ulcerating carcinoma

struction, (5) associated gastritis, (6) an inadequate medical regimen, or (7) lack of co-operation The patient should be hospitalized for re-evaluation and careful individualization of treatment

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insidious and the symptoms rarely appear urgent to the patient or his doctor The patient and physician alike are apt to temporize with prolonged periods of symptomatic treatment before proper diagnostic studies are initiated The result is a diagnostic delay of almost six months in 50 per cent of the cases of gastric cancer The relationship between the duration of symptoms and the incidence of cure is a rough one however A good opportunity for cure may exist in patients with a long history of symptoms while symptoms of short duration are not uncommonly associated with rapidly growing and widely disseminating tumors

Approximately one third of the patients with gastric cancer give a fairly typical ulcer history for the small gastric malignancy tends to simulate benign gastric ulcer clinically Unfortunately a considerable group of patients undoubtedly have gastric cancer without early symptoms and another large group who have had digestive symptoms for many years have no marked change in symptomatology with the development of carcinoma

The earliest symptoms of gastric cancer in order of frequency are epigastric pain anorexia vomiting weakness and nausea Other early symptoms include an intolerance for meats vague discomfort after meals loss of appetite and weight increased fatigability and unexplained anemia Any of these complaints should cause the physician to suspect gastric malignancy

Because physical findings are usually negative in the curable stage of a gastric malignancy the diagnosis must depend chiefly on laboratory studies gastroscopy and roentgen examination

Laboratory procedures should include complete blood studies gastric analysis and examination of the stools for occult blood Anemia variable in type is a frequent finding in patients with gastric cancer Although achlorhydria is more common in patients with cancer normal amounts of acid or hyperac[illegible]

Wh[illegible]

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h

[illegible] The repeated demonstration of occult blood in the stool of a patient on a meat free diet is also significant

Gastroscopy is valuable in demonstrat[illegible]

[illegible]

[illegible] gastroscopy

the sixth and seventh decades, and more than 90 per cent of the cases occur in patients beyond the age of 50 The mean age is 55 to 56 years

Data collected by Ivy (1955) indicate that the incidence of gastric carcinoma is influenced by environment Ivy concluded that malignant change is incited in cells by nonspecific irritants acting for example, in the margin of a gastric ulcer, or by specific carcinogens acting on the cells of the normal mucosa Low-grade carcinogens may be produced by overheated fats or may be present in food dyes, flavors, and preservatives At present there is no demonstrable relationship between the development of gastric cancer and the ingestion of alcohol hot foods, or excessively hot beverages

Genetic factors may be responsible for increased susceptibility, and both chronic gastritis and gastric ulcer may contribute to the genesis of gastric cancer The incidence of gastric cancer is significantly higher in patients having gastric polyps, heterotopic tissue in the stomach, achlorhydria or hypochlorhydria, and atrophy of the gastric mucosa Since neither gastric polyps nor heterotopic tissue is common, these conditions are not of great statistical significance as etiologic factors Hitchcock (1957), however, has emphasized the high degree of correlation between gastric cancer and gastric mucosal atrophy in patients with pernicious anemia He stated that the incidence of gastric cancer in a group of patients with pernicious anemia was 21 9 times as great as that in the general population, in patients with achlorhydria or hypochlorhydria it was 4 5 times as great Other writers, however, give the incidence of gastric malignancy in patients with pernicious anemia as only 3 to 9 times greater than that in similar age groups in the general population Hitchcock feels that the greatest number of asymptomatic cancers can be detected by roentgen examination of patients beyond the age of 50 who have achlorhydria or hypochlorhydria

Although it would appear that adequate treatment of gastritis and benign gastric ulcer should decrease the incidence of gastric carcinoma, the therapeutic response produced by vitamin B_{12} or liver extract in patients with pernicious anemia does not remove the risk of polypoid change and carcinoma of the stomach

DIAGNOSIS Because pain is not an early or pronounced symptom in gastric cancer, early diagnosis is difficult The onset is usually

(1) malignant degeneration may occur in initially benign ulcers, (2) it is sometimes difficult to differentiate benign from malignant lesions

The incidence of carcinomatous degeneration in previously benign ulcers is given by Brown (1953) as only 1 5 per cent and the generally accepted figure is less than 5 per cent Mortality statistics, furthermore, indicate that resection of all gastric ulcers will not solve the problem of gastric cancer

Carcinomas of the stomach frequently ulcerate and are *mistaken* for benign ulcers While no completely accurate differentiation can be made in all instances except by detailed microscopic study, the diagnostic error in 1,000 cases reviewed by Smith and his co workers (1953) was less than 9 per cent The problem of differentiating the benign from the malignant ulcer is particularly difficult in elderly patients, however Gastric ulcers are common in older age groups, and symptoms may be atypical Occasionally the first indication of trouble is hemorrhage Because elderly patients frequently describe dyspepsia or indigestion of long duration, a malignant lesion is often assumed to be benign

Several points may be of help in the differential diagnosis

1 Anorexia and weight loss are more frequent in patients with malignant ulceration

2 Gastric lesions must be considered malignant when gastric analysis reveals achlorhydria following the injection of histamine

3 A high percentage of ulcers distal to the incisura and involving the antrum are malignant, and ulcers on the greater curvature are rarely benign Because ulcerations along the lesser curvature above the incisura are usually benign lesions in this area can be followed by biweekly roentgen examinations and gastroscopy for a period of 4 to 6 weeks while the patient is treated medically

4 Lack of peristaltic activity is suggestive of malignancy, as is the presence of a filling defect around the ulcer or a halo about the base Spasm or edema surrounding a benign ulcer occasionally prod

5 study will reduce the percent

While prolonged *medical* and dietary *management* of gastric ulcer is not advisable, immediate surgery *is seldom* justified unless the evidence strongly indicates malignancy Patients under treat-

does not always differentiate benign lesions from malignant ones, it complements the other diagnostic studies and increases the overall diagnostic accuracy

Cytologic examination of gastric fluid by the Papanicolaou technique may be helpful The accuracy of the procedure depends upon the clinician's ability to obtain satisfactory specimens and upon the skill of the cytologist Present studies indicate that vigorous lavage with physiologic saline solution is as effective as the brush or chymotrypsin lavage in obtaining fluid for the cytologic diagnosis of gastric cancer Unequivocal demonstration of malignant cells is diagnostic, but failure to identify tumor cells does not rule out malignancy, since submucosal or intraluminal tumors will occasionally fail to yield diagnostic cellular debris

Roentgen examination of the stomach is the most accurate method of diagnosis, even though ulcerating and polypoid lesions are sometimes overlooked by experienced radiologists and early infiltrating lesions may fail to produce alterations in the gastric mucosal pattern The demonstration of a filling defect, surrounding induration, and loss of gastric pliability is highly indicative of malignancy With careful and, if necessary, repeated roentgenologic study, the diagnosis can be made correctly in as many as 90 per cent of the cases at the time of the initial examination Additional abnormalities found at the time of roentgen examination for example, gallstones or a deformed duodenal bulb—should not be allowed to divert attention from the more serious condition

In cases where the diagnosis is still in doubt after blood studies, gastric analysis, gastroscopy, cytologic study, and roentgen examination, it may be necessary to repeat these studies after a brief period of therapy By such means an accurate preoperative diagnosis can be made in 90 to 95 per cent of all cases In the remaining small group, careful pathologic study is required for absolute diagnosis

A regular yearly gastrointestinal survey utilizing all the above procedures should be performed in patients with pernicious anemia, hypochromic anemia, gastric atrophy, or histamine fast achlorhydria, and in cases where roentgen examination has demonstrated gastric polyps or loss of gastric rugae

Differentiation of Benign Gastric Ulcer and Gastric Cancer The ulcerating gastric lesion presents special problems for two reasons

(1) malignant degeneration may occur in initially benign ulcers, (2) it is sometimes difficult to differentiate benign from malignant lesions

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4 Lack of peristaltic activity is suggestive of malignancy as is the presence of a filling *defect* around the ulcer or a halo about the base Spasm or edema surrounding a benign ulcer occasionally produces a similar roentgen appearance

5 Under ideal conditions, cytologic study will reduce the percentage of error

While prolonged medical and dietary management of gastric ulcer is not advisable, immediate surgery is seldom justified unless the evidence strongly indicates malignancy Patients under treat-

ment for benign ulcer should become asymptomatic in 7 to 10 days and the ulcer should decrease in size by 50 per cent in 3 or 4 weeks Ulcers greater than 2 5 cm in diameter are more likely to recur, and may fail to heal because of fibrosis Where progressive and complete healing does not occur, the lesion must be considered malignant and surgery should be advised Since malignant lesions may occasionally re-epithelialize, recurrence of ulcer within an interval of months may be an indication for surgery

By means of these diagnostic criteria and limited periods of medical therapy while the patient is kept under careful observation, the percentage of diagnostic error can be kept low, and extensive resection of "innocent" stomachs can be avoided

TREATMENT At the present time surgical resection offers the only possible cure for gastric cancer As a result of advances in surgical techniques, the number of cases suitable for gastric resection has shown a steady increase, although the time interval between the onset of symptoms and hospital admission has been decreased but little Partial gastrectomy is usually the procedure of choice since total gastrectomy has added little to the salvage rate and is associated with a much higher mortality and greater incidence of postoperative complications Marshall (1958) reported a mortality of 3 2 per cent for partial gastrectomy and 7 per cent for total gastrectomy at the Lahey Clinic between the years 1950 and 1954

In general, the likelihood of curing gastric cancer decreases with advancing age The rate of resection is lower in older patients because of the magnitude of surgery and the presence of complicating factors such as cardiovascular and renal disease malnutrition, diabetes, and cerebral changes Where an operable malignancy is believed to exist however, elderly patients should not be deprived of the hope offered by resection Except in the presence of distant disseminated metastases, surgical exploration is often justifiable even where cure is not possible The surgeon may be able to provide some relief of pain or delay the development of obstruction

The operability of a gastric cancer cannot always be determined by clinical or accessory laboratory studies Routine liver function tests, however, often make it possible to suspect metastasis to the liver If metastatic tumor can then be demonstrated by needle

aspiration biopsy of the liver unnecessary surgery can be avoided

The care of patients having incurable gastric cancer requires great compassion and understanding. The physician rarely justifies his position more In the majority of such patients pain is con trollable The major problem is usually the emotional disturbance produced by an awareness of deterioration As the patient s anxiety and depression increase the physician s interest and assistance must be increased

The psychologic management is simplified by maintaining the patient in familiar surroundings when possible Even where little or nothing can be done from the standpoint of cure a great deal of comfort can be afforded the patient Providing pain free periods of usefulness gives a great boost to the patient s morale Analgesics should be given in sufficient doses to control pain and varied according to the patient s needs Addiction may be prevented by utilizing a variety of narcotic agents Control of discomfort should be begun with simple analgesics such as acetylsalicylic acid and codeine progressing to Demerol morphine or Dilaudid as needed Careful observation will be required to determine the quantity and f

ing or tranquiliz

esics required

Occasionally nerve root section or chordotomy may be indicated Palliative abdominal surgery should not be denied the patient whose pain is due to tumor growth or compression of sensitive tissues When surgery is not advisable roentgen therapy should be considered, even though the histologic appearance of the tumor does not justify any great hope of response Occasionally high doses delivered to localized areas are relatively effective in relieving temporarily the discomfort of pressure or obstruction In selected cases the use of steroids appears to decrease the inflammatory re action often associated with malignant growth as well as to pro duce an increase in appetite and a sense of well being

THE SMALL INTESTINE

Malignant Tumors

Approximately 3 per cent of all gastrointestinal malignancies occur in the small intestine and one third of these are in the

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The simultaneous use of sedatives antispasmodics or tranquilizing drugs may often decrease the quantity of analgesics required Occasionally nerve root section or chordotomy may be indicated Palliative abdominal surgery should not be denied the patient whose pain is due to tumor growth or compression of sensitive tissues When surgery is not advisable roentgen therapy should be considered, even though the histologic appearance of the tumor does not justify any great hope of response Occasionally high doses delivered to localized areas are relatively effective in relieving temporarily the discomfort of pressure or obstruction In selected cases the use of steroids appears to decrease the inflammatory reaction often associated with malignant growth as well as to produce an increase in appetite and a sense of well being

THE SMALL INTESTINE

Malignant Tumors

Approximately 3 per cent of all gastrointestinal malignancies occur in the small intestine and one third of these are in the

duodenum (Fig 17-7) The majority of duodenal tumors are found in the first and second portions of the duodenum and tend to be ulcerating or polypoid Adenocarcinoma is the most common type of duodenal malignancy, and sarcoma is next



FIG 17 7 Duodenal ulcer (*top arrow*) duodenal invasion by gallbladder cancer and leiomyoma (*bottom arrow*) *In this patient a 79 year old man* the roentgenogram shows an ulcer on the posterior wall of the duodenum and an irregularity of the second portion of the duodenum caused by extrinsic pressure secondary to invasion from an infiltrating gallbladder cancer There is also a benign submucosal leiomyoma of the duodenum

The outstanding symptoms and signs of small bowel malignancy include dull cramping mid abdominal pain weight loss vomiting anemia weakness an abdominal mass intestinal obstruction melena and diarrhea The symptoms may be vague and occasional patients give a history suggestive (though not typical) of ulcer Early diagnosis is difficult

The diagnosis is based largely on roentgen studies which may show constricting lesions, filling defects evidence of obstruction or mucosal distortion and ulceration Early diagnosis is jeopardized by inadequate technique overlying barium or failure to obtain



FIG 17 8 Leiomyosarcoma of the jejunum A leiomyosarcoma of the jejunum (*arrow*) is displacing the ligament of Treitz in the third portion of the duodenum and jejunum medially with destruction and distortion of the lateral jejunal wall and polypoid filling defects within the lumen One year after initial surgery there was a local recurrence of tumor which was resected Since then the patient has remained asymptomatic for a period of three years

films at proper intervals Constricting lesions may be mistaken for peristaltic contractions Unexplained dilatation is a suspicious finding and indicates the need for additional examinations Special techniques may be of help The patient may be given a saline

solution of ice water following the barium meal to provide a single, rapidly moving column of barium, or the barium solution may be suspended with methyl cellulose

Lymphosarcoma of the small intestine, a relatively rare type of malignancy, most frequently involves the ileum The most common roentgen findings are dilated loops of small bowel that tend to retain barium, and an increase in the diameter of the lumen at the site of the lesion Large areas may show considerable mucosal alteration without narrowing

The treatment of malignant tumors in any part of the bowel is surgical removal The survival rate is related to the location type, and grade of the neoplasm and to the presence or absence of metastases The prognosis is better with adenocarcinoma than with lymphosarcoma, and is better if the neoplasm is located in the jejunum or ileum rather than in the duodenum (Fig 17-8) Roentgen therapy following surgery apparently does not prolong life

Chronic Enteritis

Chronic recurring granulomatous disease of the small intestine is most frequent in young adults, although 5 to 10 per cent of the cases develop after the age of 50 Men are somewhat more susceptible than women

The terminal ileum is the site most frequently involved, hence the term "regional enteritis" or, more commonly, 'ileitis' (Fig 17-9) Lesions may occur throughout the ileum, however, or may be present in scattered areas in the ileojejunum In rare cases involvement of the duodenum may be primary, or the lesion may pass beyond the ileocecal valve, or be associated with inflammatory disease in the colon Ulcerative lesions are prominent in the acute phase When the disease becomes chronic, scarring intestinal obstruction, and fistulas may occur

Diagnosis The disease is characterized clinically by abdominal pain, diarrhea, fever, weight loss, intestinal bleeding (indicated by streaking or profuse red blood in the stools, occasional tarry stools and anemia), and by the presence of an abdominal mass and perianal abscesses and fistulas In approximately 10 per cent of the patients obstructive symptoms occur at some time during the course

of the disease Other complications include fistulas communicating with the anterior abdominal wall, fistulas between loops of bowel and adjace [illegible] abscesses [illegible] patients with long standing disease, but free perforation [illegible] peritonitis is rare Systemic complications, which occur infrequently include arthritis, evidence of vitamin deficiency, erythema nodosum and iritis



Fig 17 9 Regional enteritis Evidence of diffuse enteritis in this roentgen study of the small intestine includes dilated segments narrowed areas and loss of the mucosal pattern

Leukocytosis with white cell counts in the range of 9 000 to 12 000, is frequent Anemia is usually moderate, but may be severe

When chronic enteritis is suspected the patient should have a sigmoidoscopic examination, stool cultures, agglutinations for dysentery organisms examination of warm stools for parasites, roentgen examination of the chest to exclude tuberculosis, and a flat plate of the abdomen The roentgen findings following the introduction of barium are said by Marshak and Wolfe (1953) to be diagnostic Barium examination of the colon should precede a roentgen study

of the small intestine, since it will often reveal the diseased area and thus eliminate the risk of obstruction associated with the introduction of barium by mouth. Barium studies of the small bowel may show changes beginning with loss of the normal mucosal pattern in the terminal ileum and progressing to the narrowed "string" sign, which is diagnostic. In addition to narrowing and mucosal changes, roentgen studies may show dilatation proximal to the narrowed area, definite obstruction, fistulous tracts between loops of bowel, and occasionally filling defects. In some instances multiple areas of narrowing may be demonstrated.

Among the conditions that may produce similar roentgen findings are sprue and lymphosarcoma. Sprue is characterized by segmentation, flocculation of barium, abnormalities in motility, and dilatation of loops—findings that indicate disturbed function rather than inflammatory stenosing disease. Occasionally lymphosarcoma may involve long segments of the small intestine, producing a roentgen picture of alternating narrowing and dilatation, with mucosal destruction and fistula formation.

TREATMENT. The results with medical management may be considered as fair to good in about 75 per cent of the cases. Medical therapy includes restriction of the patient's activity within his physical and emotional limitations. Moderate physical activity may be allowed as long as the patient has no fever or complications and is able to maintain his weight. A bland diet low in fat and residue and high in protein, carbohydrate, and vitamins should be given. Accessory protein in the form of powdered supplements may be prescribed where necessary. If clinical evidence of malabsorption exists, vitamin concentrates may be administered orally, or intramuscular injections of crude liver or vitamin-B complex may be used when active diarrhea is present. Occasional transfusions of whole blood or blood products may be indicated for protein replacement or for the treatment of anemia that fails to respond to the above measures. Vitamin K (5 to 50 mg. intramuscularly or orally once a day) is indicated when bleeding is present and a prothrombin deficiency is demonstrable

Sedation adequate to provide needed rest, and antispasmodic or anticholinergic drugs to decrease excessive intestinal motility may

be useful The use of an insoluble sulfonamide (Sulfathalidine or Sulfasuxidine) in dosages of 6 to 10 Gm per day over a period of 10 to 14 days may be of value in decreasing secondary bacterial invasion or contamination of ulcerating lesions Chloromycetin, 250 mg three times daily, has also been advocated as useful in the acute stage Penicillin streptomycin, Aureomycin and Terramycin are used only in the presence of complications or prior to operation In the acute ulcerative phase a favorable response may follow roentgen therapy Unfortunately, however, results are not consistently good

Hydrocortone or prednisone, in doses of 15 to 30 mg daily, has been associated with some symptomatic improvement, although it does not appear to alter the course of the disease Occasionally corticotropin (20 mg in 500 cubic centimeters of water given intravenously over an 8 hour interval, or 20 to 30 mg of the gel given by intramuscular injection) is also helpful in producing remission of symptoms The results with corticotropin are more striking than those following cortisone When either drug is used, an antibiotic (preferably Chloromycetin) should be given concomitantly

Surgery is required for the management of complications Operative interference is usually contraindicated early in the disease when the disturbance is acute or is demonstrably diffuse, involving extensive portions of the ileum or jejunum The indications for surgery are (1) chronic localized disease with fistulas communicating to the anterior abdominal wall or with physical findings of a mass and systemic manifestations of fever and anemia, (2) the presence of perirectal abscesses (which rarely heal spontaneously and require some surgical procedure to remove the diseased portion of the bowel), (3) persistent bleeding, (4) intestinal obstruction, (5) free or walled off perforation with peritonitis

In most instances the best surgical results follow excision rather than a sidetracking procedure with exclusion As many as 65 per cent of the patients will have a recurrence at the site of resection or anastomosis several years after operation Medical treatment of recurring disease or where indicated, additional surgery will often provide another period of relief from symptoms Death owing to the disease itself is fortunately uncommon The majority of fatalities are due to surgical treatment of the complications

THE COLON AND RECTUM

Diverticulosis and Diverticulitis of the Colon

Diverticulosis and diverticulitis (Fig. 17-10) become increasingly frequent with advancing age. *Among patients beyond the age of 40* as many as one out of 5 may have diverticula. Two thirds of the

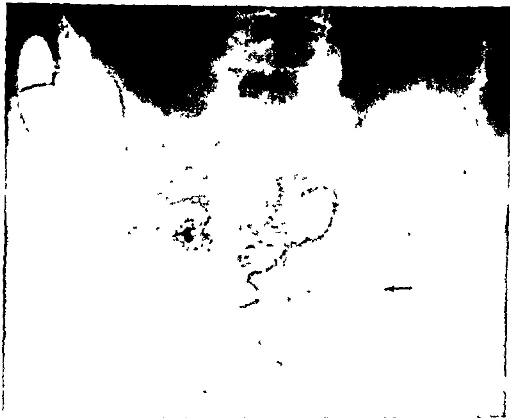


FIG 17-10 Diverticulosis and diverticulitis of the sigmoid colon with perforation and an inflammatory mass In this patient the lesion resolved completely on medical management Arrow indicates area of diverticulitis

patients with diverticulitis are beyond the age of 60 It has been estimated that one fifth of all patients with diverticulosis ultimately have symptoms, and as many as 5 per cent may eventually require surgery. The incidence of colonic diverticula is usually somewhat higher in males and in sedentary individuals who are overweight and have a long history of constipation.

Diverticula develop at areas of potential weakness in the wall of the colon, where blood vessels pass through. In some areas the vas-

cular association is undoubtedly the cause of occasional extensive hemorrhage with or without inflammation Symptoms occur when the narrow mouthed diverticula become clogged with fecal material, producing irritation, edema, and inflammation, which spread to the surrounding wall and cause obstruction In occasional cases the process leads to perforation, to abscess and peridiverticulitis, or to the development of fistula with abscess formation and stricture

DIAGNOSIS The most common symptoms of diverticulitis are pain in both lower quadrants (more frequently on the left), constipation sometimes alternating with diarrhea, and nausea and vomiting Many patients are awakened at night by abdominal pain, particularly if they have taken an enema at bedtime

The most frequent clinical findings are abdominal tenderness, low grade fever, leukocytosis (15,000 to 20,000), a palpable mass, and signs of peritoneal irritation

The diagnosis can be made only by barium examination of the colon The sigmoid alone will be involved in fully half of the cases, and the sigmoid and descending colon in an additional 25 per cent Generalized involvement of the colon occurs in only one out of five patients

TREATMENT Once the diagnosis of diverticulitis is made, therapy should be directed toward the prevention of serious complications The frequency of attacks can usually be minimized by careful regulation of the diet and bowel habits The diet should be low in residue and the fluid intake should be adequate The establishment of regular bowel habits is important, and can often be facilitated by the use of a bulk laxative to compensate for the lack of residue in the diet On such a regimen many patients who have had diverticulitis can go for years with only an occasional mild recurrence.

If an acute inflammatory process develops, a brief period of absolute bed rest is indicated, and the diet should be limited to liquids or low residue foods. If fever is present, the use of one of the insoluble sulfonamides (Sulfathalidine or Sulfasuxidine, 6 to 8 Gm per day) is of value A retention enema of 2 ounces of liquid petrolatum may be helpful if the patient is constipated In the absence of contraindications such as glaucoma and prostatism, antispasmodics are of help, the ones most commonly used are bella-

donna, 15 drops of the tincture, three to four times per day, and synthetic anticholinergics. On this regimen symptoms often subside within 24 to 48 hours, even when inflammatory masses are present.

Patients with clinical signs of obstruction should have a flat plate of the abdomen to rule out the presence of free air or peritonitis. Obstruction owing to edema and inflammation will usually respond to conservative therapy, including suction with a Miller-Abbott tube.

Perforation of an inflamed diverticulum usually produces all the signs of acute spreading peritonitis and is often associated with demonstrable evidence of free air below the diaphragm. The most common cause of left-sided subphrenic abscess is a ruptured diverticulum of the colon. It is not uncommon, however, to find small extravasations of barium outside the colon on roentgen films made after an acute attack of diverticulitis, when the patient is improving and will ultimately go on to complete recovery. Hence, careful and repeated evaluations of the patient's clinical status are important. Unless improvement is prompt and progressive, surgical intervention may be necessary.

Other indications for surgery include the demonstration of a free perforation, the development of abscess and signs of sepsis, the occurrence of fistulas or obstruction not relieved promptly by the usual measures, and frequent recurrences leading to the development of stenosis and obstruction. In some cases inflamed diverticula become adherent to adjacent structures, producing walled-off perforations and fistulas. Vesicosigmoidal fistulas are common, and may cause urinary symptoms that can be managed only by surgical intervention.

Hemorrhage may be a major complication of diverticulitis and diverticulosis. Severe exsanguinating hemorrhage, however, is not common. Severe bleeding which cannot be controlled calls for laparotomy with ligation of vessels or resection of a portion of the colon.

Association of Diverticulosis and Cancer of the Colon

The patient who has diverticula of the colon and a carcinoma (Fig. 17-11) may present a complicated diagnostic problem. Since



FIG. 17 11 Carcinoma of the colon and diverticulosis An annular constricting mucinous adenocarcinoma (*arrow*) has produced partial obstruction 10 cm distal to the hepatic flexure Scattered diverticula are seen in the colon

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Association of Diverticulosis and Cancer of the Colon

The patient who has diverticula of the colon and a carcinoma (Fig 17-11) may present a complicated diagnostic problem Since

colon and rectum interfere with function by producing irritation, ulceration, and obstruction, and manifest themselves by changes in bowel habits, pain, and anemia Carcinoma of the bowel should be suspected in patients having ill defined and persistent abdominal discomfort, a change in bowel habits, or blood in or on the stool Rectal lesions may cause tenesmus and the sensation of incomplete evacuation

Lesions in the left side of the colon invade the colon wall rapidly and spread early They often produce a decrease in the caliber of the stool and obstructive phenomena Marked distention of the abdomen may occur when a high degree of distal obstruction is present and the ileocecal valve is competent In such cases intubation is usually ineffective and surgical decompression should be carried out.

Lesions in the right side of the colon tend to grow into the lumen, ulcerate, and produce pain and anemia Occasionally a palpable mass is present Obstruction is uncommon The development of cachexia, weight loss enlargement of the liver, and jaundice usually indicates advanced disease

The diagnostic procedures are simple well established, and highly accurate The majority of bowel lesions are within reach of the examining finger or sigmoidoscope The presence of a rectal shelf on digital rectal examination may indicate involvement of the rectovesical or recto-uterine pouch Most patients can be examined successfully by sigmoidoscopy without any preparation provided they have had an evacuation that morning In this way the edema, erythema and occasional trauma produced by laxatives or enemas can be avoided If no lesion is demonstrable on sigmoidoscopy, barium examination of the colon should be performed, this method affords a high degree of accuracy in the diagnosis of lesions of the colon

When studies are negative but signs and symptoms persist, examination should be repeated at intervals of 4 to 6 weeks The stool should be examined carefully for pathogenic bacilli and amebas When urinary symptoms are present in patients with cancer of the rectum or lower sigmoid cystoscopic examination should be done prior to operation Except under unusual conditions, resection of the colon should be postponed until a biopsy specimen has been examined and reported positive for malignancy

both diseases occur with increasing frequency in advancing years and are most common in the fifth and sixth decades, they can be expected to occur simultaneously in some patients, even though there is no indication of a causal relationship between them. Both lesions occur most frequently in the sigmoid and descending colon, and occasionally both may occur in the same segment. In a review of the literature up to May, 1950, Rowe and Kollmar (1952) found only 62 cases of carcinoma and diverticulitis occurring simultaneously in the large bowel.

The roentgen findings in diverticulitis are narrowing and irregularity in a 10 to 20 cm. segment of bowel, with intact mucosa and varying degrees of irritability. In carcinoma the segment is usually smaller, the change is abrupt and often annular in character, the narrowing is more rigid and constant, and mucosal destruction may be present. The demonstration of diverticula in association with a questionable lesion of the colon indicates that the lesion is probably benign, but does not eliminate the need for continued observation and careful evaluation and re-evaluation. The response of the lesion to a brief period of conservative treatment usually permits accurate diagnosis. If the lesion can be reached with a sigmoidoscope, a specimen should be removed for biopsy, and a smear should be taken for cytologic studies by the Papanicolaou technique.

Cancer of the Colon and Rectum

The colon and rectum rank third as the most frequent sites of malignant neoplasms in both sexes. The most common malignant lesion of the colon is adenocarcinoma. Squamous cell carcinomas occur at the anus. Less common lesions include lymphosarcomas, leiomyosarcomas, and carcinoids. Cancer of the colon is responsible for approximately 15 per cent of all deaths from cancer. Because these lesions are more accessible for study and surgical removal than many malignancies elsewhere, however, a 5-year survival rate of over 50 per cent is possible.

DIAGNOSIS. Cancers in the colon and rectum tend to produce symptoms early, and as a result of educational programs that have focused attention on these symptoms, patients now report to the physician more promptly than was once the case. Lesions of the

colon and rectum interfere with function by producing irritation, ulceration, and obstruction, and manifest themselves by changes in bowel habits, pain, and anemia Carcinoma of the bowel should be suspected in patients having ill defined and persistent abdominal discomfort, a change in bowel habits, or blood in or on the stool Rectal lesions may cause tenesmus and the sensation of incomplete evacuation

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FIG 17 12 Adenomatous polyps and cancer of the colon A polypoid mucinous adenocarcinoma (*upper arrow*) is seen in the upper portion of the ascending colon proximal to the hepatic flexure An adenomatous polyp (*lower arrow*) situated just above the ileocecal valve was found to contain a focus of well differentiated adenocarcinoma

tion At the time of surgery the entire colon should be examined carefully since multiple carcinomatous lesions are not uncommon and additional polyps are frequently found Patients who have had polyps or cancers removed from the colon or rectum should have repeated sigmoidoscopic and roentgen examinations at intervals of 3 to 6 months since carcinomas of the colon occur more frequently in patients who have had a previous resection

A chronic nonspecific inflammatory disease that appears related to ulcerative colitis occasionally produces localized lesions that may be confused with carcinoma. The entity differs from the usual form of ulcerative colitis in its location (the distal sigmoid and rectum are not involved) and in the fact that it is most frequent in the older age group. It is characterized by diarrhea, bleeding, pain, weight loss, anemia, and occasionally a palpable tumor. Roentgen study reveals narrowing, spasm, and loss of haustrations in the involved section of the colon. Even at operation it may be difficult to differentiate between such an inflammatory mass and a malignant growth.

Relationship of Intestinal Polyps to Cancer

Most physicians now believe that a high percentage of cancers of the colon originate in glandular polyps (Fig. 17.12). These lesions, which are multiple in about 20 per cent of the cases, are apparently the result of an inherent abnormality rather than chronic inflammation. They occur slightly more often in men, and become increasingly frequent with age. The incidence of adenomatous polyps of the colon has been estimated at approximately 5 per cent of the adult population, and as high as 20 or 25 per cent in patients beyond the age of 70. Coller (1956) estimates that 15 to 30 per cent of such polyps ultimately become malignant.

The lesions are often localized and grow slowly. They are usually asymptomatic until they reach sufficient size to produce changes in bowel functions, or until they ulcerate and bleed, or become malignant. Since small benign polyps do not cause symptoms as a rule, the importance of routine sigmoidoscopic examinations in elderly patients cannot be overemphasized.

Because of the high incidence of malignant degeneration, all intestinal polyps should be removed or destroyed, even though biopsy may fail to disclose evidence of cancer. Small lesions in the rectum or rectosigmoid may be destroyed by fulguration, removed with the biopsy forceps, or excised with a base clamp and ligature, as necessary. Lesions higher in the colon will require for diagnosis roentgen studies and occasionally double contrast studies with air insufflation, and must be removed by laparotomy with segmental resec-

there is sufficient time to perform a complete and satisfactory medical evaluation

DIAGNOSIS Patients should be hospitalized immediately when the diagnosis is suspected Laboratory procedures that should be ordered include a urinalysis, with examination for urine urobilinogen determinations of serum lipase amylase and sugar white blood cell and differential cell counts determinations of serum bilirubin serum albumin and globulin and serum alkaline phosphatase and a cephalin flocculation test An elevated serum alkaline phosphatase provides the best evidence of extrahepatic obstruction It is well recognized that older patients do not exhibit the degree of leukocytosis and tenderness seen in younger persons as a response to acute inflammation Baseline electrocardiograms should be taken since nonspecific changes secondary to cholecystitis or pancreatitis may occur

Flat plates of the abdomen and chest may reveal opacities in the gallbladder region evidence of ileus or the presence of free air in the biliary tree they are also helpful in excluding other diseases within the abdomen or chest

Patients with acute cholecystitis should be seen by a surgical consultant as early as possible since the attack may not resolve spontaneously and examination at the onset may permit a more critical evaluation of the course during the first 24 to 48 hours

TREATMENT As soon as the diagnosis of acute cholecystitis seems reasonably certain the patient should be put to bed and gastric suction and decompression instituted to alleviate nausea vomiting and distention Opiates and antispasmodics such as meperidine 50 to 100 mg and atropine 0.4 mg given subcutaneously may be used as necessary to control pain Where fever and evidence of sepsis are present the patient should receive tetracycline 250 mg by mouth every 6 hours day and night or 0.5 to 1.0 Gm administered intravenously in two equal doses at 12 hour intervals If necessary penicillin may also be used either in the aqueous solution or in the repository form the daily dose should be 300,000 to 600,000 units divided into equal portions and given subcutaneously or intramuscularly at intervals of 4 to 12 hours depending upon the clinical course

Preparation for Surgery

Advanced age in the patient is itself no contraindication to radical surgery. Older patients who have been properly selected and evaluated and given adequate preoperative treatment are well able to tolerate major resections of the colon Preparation should include a period of hospitalization adequate to permit correction of anemia and hypoproteinemia, restoration of blood volume, and sterilization of the bowel with an insoluble sulfonamide given orally in a dosage of 6 to 8 Gm per day for 4 to 5 days or an antibiotic given for 24 to 48 hours B complex vitamins and vitamin K should be given parenterally during the period when preoperative medication suppresses bacterial growth and vitamin synthesis Because intestinal obstruction may produce major electrolyte disturbances with depletion of sodium, potassium, and chlorides, preoperative determinations of the serum sodium, potassium, chlorides, carbon dioxide combining power, and nonprotein nitrogen should be done as a guide to replacement therapy with intravenous infusions of hypertonic glucose in water, normal saline, or Ringer's solution with potassium chloride

Because neoplastic growth is slower, the lymphatic circulation diminished, and the circulatory system less active in older patients the prognosis following surgery for cancer of the colon may be more favorable than in earlier life Even if cure is not possible, considerable palliation can usually be provided by surgical means

THE GALLBLADDER

Acute Cholecystitis

Acute cholecystitis is the commonest complication of cholelithiasis It is usually due to biliary duct obstruction, which produces characteristic symptoms focusing attention on the biliary tract Pain is the most frequent symptom, and is commonly located in the right upper quadrant Nausea, vomiting fever, localized tenderness, and mild jaundice are frequent findings The patient is usually acutely ill A tender, palpable gallbladder is often an early finding Circumstances may limit study and management to a consideration of the biliary pathology itself In most cases, however,

likely explanation is impaction, obstruction, gangrene, and perforation of the gallbladder into the first or second portion of the duodenum Roentgen examination will provide confirmatory evidence of small bowel obstruction, and occasionally air will outline the biliary tree, indicating a cholecystenteric fistula Calcium stones



FIG 17 13 Fistulous communication between the biliary tree and the small intestine Barium studies of the upper gastrointestinal tract show extravasation of barium into biliary ducts (*arrow*)

may be visualized in the bowel lumen Complete obstruction that does not respond to medical management is an indication for surgical intervention Occasionally stones will be passed from the bowel, and decompression can be obtained by intubation and

Con

ar

The patient should be kept under careful observation including charting and analysis of the temperature pulse and respirations every two hours The abdomen should be examined frequently to determine any increase or decrease in the signs of peritoneal irritation and the presence or absence of abdominal masses Determinations of the leukocyte and differential cell counts should be made at intervals of 2 to 4 hours and where necessary determinations of the serum bilirubin serum amylase blood urea nitrogen and blood sugar should be done once or twice daily

During the period of observation associated disturbances such as congestive failure diabetes prostatism or electrolyte imbalance should be corrected as far as possible Disturbances of sodium and potassium levels and water balance may be treated by the use of a 5 per cent solution of glucose in distilled water or isotonic saline with 20 to 40 mEq of potassium depending on the initial determination added to each 1 000 cubic centimeters

Seventy five per cent of the patients will improve sufficiently within 24 to 72 hours so that more careful study can be carried out to establish a primary diagnosis and eliminate the possibility of other complicating diseases such as pancreatitis Gradual increase *in activity the oral intake of fluids (fruit juice milk gelatin and* broth) and gradual return to a full diet may be permitted when signs and symptoms subside

COMPLICATIONS Complications are more frequent in older patients who have a long history of biliary tract disease Surgery is indicated when the temperature remains elevated the leukocyte count increases signs of peritoneal irritation develop or an abdominal mass appears Ten to 15 per cent of the patients will require early surgical intervention because of failure to respond to medical management

Possible complications include acute perforation leading to bile peritonitis A more frequent complication is localized liver abscess In rare cases fistulous communication with the intestine develops producing gallstone ileus (Figs 17 13 17 14) Approximately 1 per cent of the cases of intestinal obstruction are said to be due to gallstones When symptoms of acute obstructive cholecystitis are followed by evidence of simple mechanical obstruction of the bowel (pain nausea vomiting distention and obstipation) the most

likely explanation is impaction obstruction, gangrene, and perforation of the gallbladder into the first or second portion of the duodenum Roentgen examination will provide confirmatory evidence of small bowel obstruction, and occasionally air will outline the biliary tree indicating a cholecystenteric fistula Calcium stones



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may be visualized in the bowel lumen Complete obstruction that does not respond to medical management is an indication for surgical intervention Occasionally stones will be passed from the bowel, and decompression can be obtained by intubation and suction

Complications such as pancreatitis and hepatitis or hepatic coma are more frequent in older age groups Surgery must be approached

The patient should be kept under careful observation, including charting and analysis of the temperature, pulse, and respirations every two hours. The abdomen should be examined frequently to determine any *increase or decrease in the signs of peritoneal* irritation, and the presence or absence of abdominal masses. Determinations of the leukocyte and differential cell counts should be made at intervals of 2 to 4 hours, and, where necessary, determinations of the serum bilirubin, serum amylase, blood urea nitrogen, and blood sugar should be done once or twice daily.

During the period of observation associated disturbances such as congestive failure, diabetes, prostatism, or electrolyte imbalance should be corrected, as far as possible. Disturbances of sodium and potassium levels and water balance may be treated by the use of a 5 per cent solution of glucose in distilled water or *isotonic saline*, with 20 to 40 mEq of potassium, depending on the initial determination, added to each 1,000 cubic centimeters.

Seventy-five per cent of the patients will improve sufficiently within 24 to 72 hours so that more careful study can be carried out to establish a primary diagnosis and eliminate the possibility of other complicating diseases such as pancreatitis. *Gradual increase in activity*, the oral intake of fluids (fruit juice, milk, gelatin, and broth), and gradual return to a full diet may be permitted when *signs and symptoms subside*.

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Possible complications include acute perforation leading to bile peritonitis. A more frequent complication is localized liver abscess. In rare cases fistulous communication with the intestine develops, producing gallstone ileus (Figs. 17-13, 17-14). Approximately 1 per cent of the cases of intestinal obstruction are said to be due to gallstones. When symptoms of acute obstructive cholecystitis are followed by evidence of simple mechanical obstruction of the bowel (pain, nausea, vomiting, distention, and obstipation), the most

of nonspecific symptoms including epigastric pressure, fu
nausea, heartburn or intolerance to fatty foods Some patien
have many of the above symptoms in combination

It must be emphasized that chronic gallbladder disease is
associated with vague, nonspecific complaints similar to
found in association with gastrointestinal malignancies Th
quency of biliary disease in older people makes it likely that
or abnormal gallbladder function may be demonstrated by
ecystography in some instances where the gallbladder has n
to do with the presenting complaints The possibility that gall
may coexist with a neoplasm elsewhere in the digestive tract
not be overlooked It is only by careful and complete study th
lesion (or lesions) responsible for the patient s symptoms v
revealed and proper treatment can be instituted Such a
should include blood counts endoscopy cholecystographi
complete barium studies of the digestive tract duodenal dr
and examination of bile for the presence of cholesterol and c
oxalate crystals examination of stools for ova parasites and
and determinations of liver function

TREATMENT The time to treat cholecystic disease is
definite symptoms appear usually in early middle age D
management *is often* of help If one considers stasis a fac
etiology and symptomatology it would seem logical to give
quate fat to stimulate the gallbladder to empty It is ger
inadvisable however to increase the fat intake in this age
and diets containing normal or excessive amounts of fat ofte
duce severe symptoms in such patients Contraction of the
bladder may force stones into smaller ducts producing by
obstruction and colic Patients generally do better on a bland
irritating diet similar to that used in peptic ulcer

In some cases where there is no evidence of obstruction c
extract tablets *0.2 to 0 3 Gm* or dehydrocholic acid (Dech
0 25 Gm may be given three times a day after meals and
provide some symptomatic relief *Other* measures that may pr
varying degrees of symptomatic relief include limitation of ac
reduction in weight for obese patients smaller feedings the
tion before breakfast of



Fig 17 14 Gallstone ileus A P film of the abdomen in a 75 year old woman, *showing* dilated intestinal loops and a density in the left lower quadrant (*arrow*) that represents a gallstone

cautiously in patients with physical or laboratory findings indicative of hepatic cellular damage or impairment of liver function Where possible, operation should be postponed until re-evaluation can be carried out and prophylactic measures instituted

Chronic Gallbladder Disease

Chronic gallbladder disease appears to be the result of bile stasis, infection, and certain endocrine and metabolic factors the most important of which are obesity, hypercholesterolemia, and pregnancy The symptoms are varied Some patients present only attacks of biliary colic involving the right upper quadrant, with radiation to the epigastrium or back At times the attacks may simulate acute pancreatitis or angina, or may be associated with one of these conditions An additional group of patients have a variety

is strongly suggestive of common duct distention The pain may radiate around to the right subscapular region and less frequently to other quadrants of the abdomen Patients may give a history of recurring episodes of jaundice and intermittent pain chills and fever when an incomplete ball valve type of obstruction occurs

Complications are indicated by persistent pain jaundice, fever leukocytosis and elevation of the sedimentation rate Infection and obstructive cholecystitis may result in empyema The frequency with which stones are found in the ductal passages of patients with cholelithiasis varies with the clinical incidence of common duct obstruction and operative cholangiography the reported incidence has varied from 5 to 35 per cent Stones small enough to pass through the cystic duct may remain in the common duct for long periods of time producing symptoms only when they increase in size The presence of stones in the extrahepatic ducts ultimately may produce dilatation thickening fibrosis and even ulceration when the stones become impacted

TREATMENT The mortality in elderly patients undergoing cholecystectomy for acute cholelithiasis or choledocholithiasis may be as high as 5 to 8 per cent and is as much as 8 times the mortality associated with elective biliary tract surgery in this group When conditions or complications arise that necessitate immediate surgical intervention however the well prepared elderly patient is usually able to tolerate cholecystectomy which is the procedure of choice

Cholecystostomy may be done under local anesthesia when the patient's condition is critical when stones impacted in the common duct have caused severe illness of long standing when the presence of peritonitis or inflammation in and about the biliary tree makes identification of structures difficult or when the patient has a life expectancy so short that the probability of death from another primary disease is greater than that of recurring biliary tract disease Under ordinary circumstances elective cholecystectomy is indicated following an emergency cholecystostomy If cholecystostomy is done and the postoperative course is satisfactory an attempt should be made to visualize the biliary tree prior to the patient's discharge from the hospital It is important to recognize that

of magnesium sulfate, and saline catharsis with magnesium citrate, 200 cc., or sodium phosphate, 10 mg, two to three times a week

Cholelithiasis and Gallstone Colic

There is a close relationship between gallstones and gallbladder disease Bockus (1946) has stated that 80 per cent of patients with symptoms severe enough to require surgery for a diseased gallbladder will have gallstones. Other writers give figures nearer 90 per cent. The reported incidence of gallstones in the adult population varies from 2 to 30 per cent, depending upon the source of material and the age group studied. In persons over the age of 40 the incidence of gallstones found at autopsy ranges from 6 to as high as 30 per cent in the ninth decade. Biliary calculi are much more common in women

DIAGNOSIS When cholecystographic studies are interpreted carefully and repeated if necessary, the findings are extremely reliable Since stones have been reported to form within a period of two to three months, it may be necessary to repeat cholecystographic studies at frequent intervals in order to rule out cholelithiasis as the cause of complaints The roentgen diagnosis of cholelithiasis is most accurate and the diagnosis of cholecystitis least accurate when the gallbladder's ability to concentrate the dye is least impaired Repeated failure to demonstrate a gallbladder shadow after administration of the dye is a highly reliable indication of disease, and is presumptive evidence of stones In as many as 90 per cent of such cases, nonopaque calculi will be found at the time of operation

The symptoms of gallstone colic are determined to a large degree by the patient's reactivity, the location of the stones, the presence or absence of infection, and the presence of other pathologic conditions Gallstone colic usually begins as epigastric pain that often increases in severity, simulating bowel cramps Typical attacks require opiates for the relief of pain, which may actually be accentuated by small doses of analgesics When infection and associated peritoneal irritation develop, the pain will shift to the right upper quadrant. Vomiting may be a side effect of the analgesic, but

is too great to make surgery advisable for such a large group, (3) asymptomatic and nonfunctioning gallbladders may not contain stones, (4) a mortality of 0.5 to 1 per cent is associated with elective cholecystectomy, and (5) dyskinesia or stricture developing after operation may cause complaints referable to the biliary tree in patients who were previously asymptomatic

In my opinion, surgery should be reserved for patients having demonstrable stones and symptoms referable to the biliary system

PREPARATION OF PATIENTS FOR GALLBLADDER SURGERY Because of the high incidence of associated abnormalities such as hypertension, diminished cardiac reserve, and renal or hepatic impairment, careful and complete preoperative evaluation is particularly important in elderly patients undergoing elective surgery The result will be a more benign postoperative course Coronary artery disease is not a contraindication to surgery In the obese patient a

[illegible]

[illegible], and should include determinations of the prothrombin time, total serum proteins, serum albumin and globulin, and alkaline *phosphatase*, a cephalin flocculation test, and, in the absence of jaundice, a bromsulfalein test In jaundiced patients the determination of urinary urobilinogen may be helpful In patients with abnormal prothrombin times, the response to a test dose of vitamin K also provides helpful information Often marked preoperative improvement will result from parenteral injections of vitamin K, together with a diet adequate in protein and carbohydrate and other nutritional substances

Cardiac and renal function should be evaluated by clinical and laboratory procedures, and in males the condition of the prostate should be investigated Blood levels of sugar and nonprotein nitrogen should be determined, and the digestive tract should be studied [illegible]

[illegible] complicates diagnosis and management.

Preoperative medication should be light and should not include morphine Atropine may be preferable to scopolamine A prolonged general anesthetic is not well tolerated in this age group

jaundice is common in acute cholecystitis and may encourage unnecessary exploration of the common duct, with a considerable increase in the mortality rate

MANAGEMENT OF ASYMPTOMATIC GALLSTONES In many patients with gastrointestinal complaints, "complete study" reveals evidence of cholelithiasis which, in the opinion of the physician, may not be related to the presenting complaints The Mayo Clinic has followed 112 patients with asymptomatic gallstones for 10 to 20 years (Comfort, *et al*, 1948) Colic ultimately developed in 20 cases, jaundice in 5 Twenty-four had cholecystectomies and 3 died following surgery The experience of many physicians has been similar to that reported by the Mayo Clinic namely, that half the patients found to have gallstones after the age of 50 will remain relatively asymptomatic The other half will have varying degrees of discomfort Obviously, it is impossible to predict which patients will have symptoms related to the presence of gallstones

Surgeons and clinicians are not in complete agreement as to the status of "prophylactic" cholecystectomy in patients with asymptomatic cholelithiasis Those in favor of surgery point out that (1) the mortality of the procedure in an otherwise well patient is less than 1 per cent, (2) the surgical mortality increases to 3 to 8 per cent in patients who have symptoms or complications resulting from attacks of acute cholecystitis or other unrelated degenerative diseases, (3) complications may arise that will necessitate surgical intervention under unfavorable circumstances, (4) the high mortality associated with biliary surgery in persons over 65 is due to complications of pancreatitis and other conditions associated with obstructive cholecystitis, (5) extensive inflammatory disease may be present in the absence of symptoms, (6) small stones may already be passing into the common duct, and (7) there is a probability of increasing stone formation, progressive gallbladder disease, and the ultimate risk of cancer

The arguments of those not in agreement with this philosophy are as follows (1) since most patients with an initial attack of acute obstructive cholecystitis respond favorably to medical management, simple cholecystectomy can usually be performed as an elective procedure in those patients who have symptoms, (2) the number of patients past 60 who harbor asymptomatic gallstones

is too great to make surgery advisable for such a large group, (3) asymptomatic and nonfunctioning gallbladders may not contain stones, (4) a mortality of 0 5 to 1 per cent is associated with elective cholecystectomy, and (5) dyskinesia or stricture developing after operation may cause complaints referable to the biliary tree in patients who were previously asymptomatic

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Liver function studies should be done routinely before gallbladder surgery, and should include determinations of the prothrombin time, total serum proteins, serum albumin and globulin, and alkaline phosphatase, a cephalin flocculation test, and, in the absence of jaundice, a bromsulfalein test In jaundiced patients the determination of urinary urobilinogen may be helpful In patients with abnormal prothrombin times, the response to a test dose of vitamin K also provides helpful information Often marked preoperative improvement will result from parenteral injections of vitamin K, together with a diet adequate in protein and carbohydrate and other nutritional substances

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Postoperative care should include early ambulation where no contraindications are present, and passive exercises if prolonged stay in bed is necessary.

Postcholecystectomy Syndrome

Complaints simulating chronic cholecystitis with cholelithiasis sometimes persist after cholecystectomy has been performed. Such cases require painstaking evaluation. The most common causes are residual stones, pancreatitis, postoperative sphincter spasm and common duct distention, a persistent remnant of the cystic duct, unrecognized carcinoma, postoperative stricture, and neuroma. Careful exploration and operative cholangiograms at the time of cholecystectomy will usually reveal any calculi present elsewhere in the biliary tree. In patients who have had prolonged drainage with a T tube, cholangiography should be performed prior to removal of the tube.

Persistence of an external biliary fistula following cholecystectomy is strongly suggestive of residual stones in the common duct. In the absence of demonstrable jaundice, persistent elevation of the alkaline phosphatase and retention of bromsulfalein is also strong evidence of residual obstruction.

In patients who have had a cholecystectomy, intravenous cholangiography utilizing new contrast media has been moderately successful in providing visualization of the bile ducts. This method may also be utilized in patients who have not had previous gallbladder surgery when oral cholecystography fails to show the gallbladder, or when pyloric obstruction or other disturbances interfere with the absorption of the dye. Its greatest usefulness, however, lies in making it possible to visualize the biliary ducts in patients who have undergone cholecystectomy. Occasionally cystic duct remnants, anomalies, strictures, tumors, or residual stones (Fig. 17-15) may be demonstrated by intravenous cholangiography. Unexplained dilatation, retention of the contrast medium, and delay in evacuation of bile may suggest dyskinesia. Since the contrast medium must be picked up and excreted by the liver, this technique also serves as a measure of hepatic function. Visualization of the hepatic ducts is usually unsatisfactory when associated hepatic insufficiency is present. Intravenous cholangiography also gives

poor opacification of the biliary tree in patients with obstructive jaundice

The management of the postcholecystectomy syndrome is dependent upon the cause The use of nitroglycerin a bland diet antispasmodics and "medical duodenal drainage * two to three



Fig 17 15 Cystic duct remnant and residual ductal stones Oral cholangiogram showing the cystic duct remnant (*top arrow*) and multiple filling defects (*bottom arrows*) representing nonopaque calculi in the dilated common duct

times a week may be of help If these measures are not effective sphincterotomy will usually relieve symptoms Obviously the demonstration of residual stones stricture or cystic duct remnants requires additional surgery

* After taking 10 to 15 Gm of magnesium sulfate followed by a light breakfast the patient reclines on his right side for 30 to 60 minutes

Postoperative care should include early ambulation where no contraindications are present, and passive exercises if prolonged stay in bed is necessary

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Cancer

Cancer of the gallbladder is most common in the seventh and eighth decades, but occurs only in patients having cholelithiasis It is found in about 1 per cent of all gallbladders removed at operation, and comprises 3 to 4 per cent of all malignancies The most frequent symptoms are pain, jaundice, weight loss, nausea, and vomiting The prognosis is uniformly poor except in those cases diagnosed following cholecystectomy The fact that the development of cancer precedes by many months the onset of symptoms limits the number of resectable cases and has been a potent argument for surgery in the asymptomatic patient with cholelithiasis

THE PANCREAS

Pancreatitis

Pancreatitis is probably best considered as a physiologic disturbance in patients having an anatomic predisposition namely, a common passageway above the papilla of Vater for the common bile duct and the duct of Wirsung When the papilla is occluded by sphincter spasm or mechanical agents, bile is regurgitated into the pancreas, producing necrosis and causing the release of proteolytic enzymes Metaplasia of ductal epithelium, by producing obstruction and rupture of arteriosclerotic vessels in the pancreas, may also lead to inflammatory changes

The frequent finding of pancreatitis in patients without demonstrable biliary tract disease and in patients having separate bile and pancreatic ducts, the demonstration of secretory pressures in the pancreas higher than those in the biliary tract, and the failure of diversionary operations on the biliary tract all serve to emphasize the presence of multiple etiologic factors to account for the variation in symptoms and response to therapy Other contributing causes include large meals, excessive alcoholic intake, abdominal trauma, peptic ulcer, and infections

Factors affecting pancreatic secretions include (1) parasympathetic stimulation by way of the vagus nerve, which produces a high concentration of enzymes, (2) the hormone, secretin, elaborated by the duodenal mucosa through the action of hydrochloric

acid which results in a high volume of secretion poor in enzymes and (3) other nutritional and chemical stimuli not too well under stood Excessive alcohol intake prior to attacks has been estimated to be a predisposing factor in 20 to 68 per cent of the cases Alcohol not only increases gastric acidity, thus stimulating the production of secretin it also has a nonspecific irritating effect that produces duodenitis edema and sphincter spasm

The reported incidence of pancreatitis varies from 0 009 per cent in a series of 5 000 hospital admissions to 0 3 per cent when a rou tine determination of the serum amylase was done in all patients having abdominal complaints

DIAGNOSIS The clinical picture of acute pancreatitis is not con sistent and may suggest biliary tract disease cholecystitis chol elithiasis myocardial infarction acute perforation of an abdominal viscus diverticulitis intestinal obstruction mesenteric thrombosis pneumonia of the left lower lobe or alcoholic gastritis The diagno sis should be suspected in patients with abdominal colic who have pain and shock out of proportion to the physical findings and who fail to respond to moderate amounts of opiates A history of exces sive alcohol intake or of gallbladder disease is often obtained

Pain is the chief symptom but it varies from indigestion" to severe colic with shock As a rule the degree of pain is out of pro portion to the abdominal findings unless associated disease of the biliary tract is present The pain of uncomplicated pancreatitis is usually located in the epigastrium radiating into the back or left upper quadrant Radiation to the right may occur when there is associated disease of the biliary tract *

Distention of the abdomen is frequent and adynamic ileus is not uncommon In rare cases discoloration over the flanks (Grey Turner s sign) is noted Icterus is present in 10 to 15 per cent of the cases and a palpable epigastric mass in 10 per cent Evidence of pneumonitis or even fluid at the left lung base may occur and is difficult to interpret A low grade fever may be present. The total white blood cell count the degree of icterus and elevation of the serum alkaline phosphatase are related to the severity of the attack The serum calcium may fall in severe instances where pancreatic

* In 5 to 10 per cent of the cases acute cholecystitis will be associated with the pancreatitis

enzymes spread into the peritoneal cavity and produce liquefaction, necrosis, and calcification

The most helpful diagnostic laboratory procedure is the serum amylase determination, which is significantly elevated for 48 hours or longer after onset of the attack Determination of the serum lipase takes longer to perform, this value may rise after 48 hours and remain elevated for 5 to 7 days A serum amylase level 3 to 5 times the normal laboratory value invariably indicates primary pancreatitis Perforating peptic ulcer, peritonitis resulting from other causes, and disturbances of the salivary glands may also produce elevated levels of amylase, but rarely to the degree caused by primary pancreatic involvement In susceptible patients the administration of morphine sulfate will also be followed by elevated amylase, hence it is important to draw blood for determinations of the enzyme levels before administering opiates

A flat plate of the abdomen is useful in ruling out the presence of free air, calcification in the biliary tree or pancreas, and evidence of localized ileus

MANAGEMENT OF ACUTE PANCREATITIS It is generally agreed that in the absence of complications treatment should be medical The first consideration is usually the relief of pain This can be accomplished in most cases by tablets of nitroglycerin (0 3 to 0 4 mg used sublingually), meperidine hydrochloride (Demerol) in doses of 50 to 100 mg given intramuscularly every 3 to 4 hours as needed, methantheline bromide (Banthine), 25 mg given intramuscularly every 6 hours, or Pathilon (tridihexethyl), 20 mg every 6 hours Barbiturates may be used judiciously, and occasional patients will require a left paravertebral block of dorsal nerve roots 8 to 10 The use of morphine is contraindicated If shock is present, fluid balance should be restored by the slow intravenous administration of a 5 per cent solution of glucose The use of blood or blood products is rarely necessary, although in severe cases serum albumin given intravenously in doses of 100 to 500 ml daily for 3 to 5 days may have some value

The use of intubation and gastric suction during the acute episode to minimize distention, remove acid, and decrease pancreatic stimulation by inhibiting the production of secretin is of extreme importance Insulin may be required to control transient diabetes

The intravenous administration of calcium gluconate 1 Gm 2 to 3 times daily may be needed to control tetany Patients showing persistent abdominal pain fever leukocytosis or the development of an abdominal mass should be given antibiotic therapy with tetracycline (chlortetracycline hydrochloride oxytetracycline hydrochloride or tetracycline hydrochloride) 0 5 to 1 Gm intravenously 100 mg every 6 hours by deep intramuscular injection or 250 mg every 6 hours orally Surgery during the acute phase should be avoided if possible It is indicated only if other serious intra abdominal pathology such as perforation of a viscus infarction rupture of the gallbladder or perforation of a peptic ulcer cannot be satisfactorily excluded

The prognosis during the acute episode of pancreatitis obviously depends upon the cause the degree of obstruction the history of previous attacks or antecedent injury and the ultimate fate of the pancreatic blood supply It has been estimated that 85 per cent of the cases of pancreatitis are primarily edematous In this group a mortality of not more than 5 per cent may be anticipated In the remaining 15 per cent necrosis develops and the mortality rate may be as high as 50 per cent A palpable mass ultimately develops in about 10 per cent of the patients with pancreatic necrosis *Recurrences* may be anticipated in as many as a third of the patients who have an acute attack of pancreatitis

Additional studies indicated after the acute attack subsides include a glucose tolerance test cholecystogram and barium examination of the *upper* digestive tract Failure to visualize the gall bladder is common during the acute and convalescent phases of pancreatitis and *should* not be interpreted as pathognomonic of cholecystitis or cholelithiasis until roentgen studies have been repeated during an asymptomatic interval Interval x ray study is also helpful in that it may demonstrate a wide duodenal loop anterior displacement of overlying viscera or other diseases of the digestive tract such as an active peptic ulcer Cholecystectomy and exploration of the common duct are indicated in cases where gall bladder disease and stones *are demonstrated*

Management of Chronic Recurring Pancreatitis The medical management of chronic pancreatitis is not satisfactory Pancreatic insufficiency may be improved by large doses of pancreatin

enzymes spread into the peritoneal cavity and produce liquefaction, necrosis, and calcification.

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The use of intubation and gastric suction during the acute episode to minimize distention, remove acid, and decrease pancreatic stimulation by inhibiting the production of secretin is of extreme importance. Insulin may be required to control transient diabetes



FIG 17 16 Carcinoma of the head and body of the pancreas A 57 year old woman with a past history of diabetes and cholelithiasis complained of nausea vomiting and abdominal pain Roentgen studies reveal a large hiatal hernia (*top arrow*) diverticula of the third portion of the [illegible] arrow) a [illegible] of the [illegible] cinoma

(0.5 to 1 Gm.) with meals, and minor symptoms may be controlled by the methods utilized in treating acute pancreatitis. If recurrences are numerous and severe, however, operative intervention may be necessary. Best results may be anticipated in those patients who have remediable biliary tract disease. Such patients should be treated surgically after careful preoperative preparation.

It is becoming increasingly apparent that many instances of chronic recurring pancreatitis are due to obstruction of an intraglandular duct. Duval (1954) has performed pancreaticojejunostomy with caudal decompression of the gland on patients who have clinical evidence of ductal block: elevated serum enzymes, undigested fecal fat on a measured dietary intake, and diminished output of pancreatic enzymes following stimulation with secretin and Urecholine. At the time of operation, an attempt is made to confirm the diagnosis by ductal visualization with radiopaque material. Further and more complete evaluation may indicate this procedure to be of real value in selected cases.

In some cases of chronic pancreatitis calcification within the gland may be revealed by roentgen studies. Calcific pancreatitis that causes pain, steatorrhea or diabetes, with or without associated narcotic addiction, alcoholism or complications such as pancreatic cyst and intraductal calculi, requires special investigation and evaluation of possible therapeutic procedures. Occasionally splanchnicectomy, partial pancreatic resection, or sphincterotomy may be of value. In other cases it may be necessary to alter the biliary drainage so as to prevent reflux into the pancreas, carry out measures to reduce gastric acidity, or perform pancreatolithotomy or even total pancreatectomy. The diabetes associated with chronic calcific pancreatitis is not worsened by pancreatectomy.

Cancer of the Pancreas

Diagnosis. Pancreatic cancer makes up 1 to 2 per cent of all malignant lesions. The most common manifestations, in order of frequency, are jaundice, pain, weight loss, change in bowel habits, nausea, vomiting, insomnia, anorexia, and the presence of a mass. In 70 to 80 per cent of the cases the head of the pancreas (Figs. 17-16, 17-17) is involved and jaundice is an early symptom. Most cases are diagnosed only after the development of jaundice, which



Fig 17 16 C⌐
A 57 year old
lithiasis compla
Roentgen studi ... ma (top arrow) di
verticula of the third portion of the duodenum (*bottom arrow*) a nonfunctioning gallbladder and lateral displacement of the stomach (*middle arrow*) At celiotomy an inoperable carcinoma involving the head and body of the pancreas was found

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diagnosed as psychiatric problems The difficulty which these patients often have in convincing the physician that their discomfort is significant is enough to precipitate a disturbance of behavior

A paucity of physical findings is characteristic Evidence of weight loss will be noted in approximately one third of the patients Hepatomegaly may be found but is often unassociated with the pancreatic disease The gallbladder is palpable in 40 to 60 per cent of the patients (Courvoisier s sign) A palpable mass, present in 10 to 15 per cent is an indication of far advanced disease Venous thromboses are often associated with malignant tumors of epithelial origin, particularly those of the body and tail of the pancreas Such unexplained findings in patients with abdominal pain should suggest the possibility of pancreatic cancer

The routine laboratory examinations are generally of little value *The blood* findings are usually normal Anemia is infrequent although mild [illegible]

[illegible] ycosuria occurs in 10 to 15 per cent Glucose tolerance tests however are frequently abnormal, and may show the high curve typical of diabetes Steatorrhea is more likely to occur when obstructive jaundice is present or when extensive destruction of the gland *has already* occurred The blood levels of amylase and lipase are variable and difficult to interpret, they tend to be altered only late in the *disease* The persistent finding of occult blood in the stool without *demonstrable* source may serve to emphasize the significance of other findings Tumor cells may be noted in a histologic study of the duodenal drainage

Roentgen *studies* of the upper gastrointestinal tract are diagnostic in as high as 50 per cent of the cases, depending upon the location and extent of the disease Careful study of the stomach and duodenal loop may reveal elevation or widening of the duodenal loop pressure defects on the duodenum or stomach, displacement of adjacent viscera occasionally *ulceration of the* second portion *of the* duodenum or even evidence of pyloric or duodenal obstruction A characteristic "*inverted three*" sign may be present Fifteen to 20 per cent of the patients who are jaundiced mildly or not at all will fail to show concentration of the dye on cholecystographic study

is produced by obstruction of the common bile duct Although the early symptoms may be variable, the disease late in its course presents a characteristic syndrome of weight loss, abdominal pain, and bowel changes in patients whose laboratory studies and physical findings are essentially normal

Pain occurs at some time in 50 to 80 per cent of all cases The pain varies in quality and intensity from a dull aching or boring



Fig 17 17 Carcinoma of the pancreas The descending and transverse portions of the duodenum show changes in the mucosal pattern and constriction of the lumen, with a characteristic "inverted 3" deformity (*arrow*)

sensation to colic It is frequently lessened by leaning forward or by other measures that relieve pressure on retroperitoneal tissues It is made worse by lying on the back, and hence produces more discomfort at night, interfering with rest It is often aggravated by eating or by ambulation Many patients insist that eructation or enemas may give relief

The average interval between the initial symptoms and diagnosis is 6 to 9 months, by this time 40 per cent of the patients will have noted weight loss In the absence of jaundice many such patients with insomnia, weight loss, and digestive complaints have been

50 Any of these conditions, however, may cause jaundice in patients over 60

In a large general hospital, the cases of jaundice are almost equally divided between the extrahepatic and intrahepatic types Diagnosis is dependent upon careful evaluation and weighing of numerous variables in the history (Table 17-2), physical examination (Table 17-3), and selected accessory studies, including liver function tests, analysis of duodenal contents, and roentgenograms (Table 17-4) By such means the correct diagnosis can be ascertained preoperatively in approximately 85 per cent of jaundiced patients

TABLE 17 2 VARIABLES IN HISTORIES OF PATIENTS WITH GALLSTONES CANCER, HEPATITIS CIRRHOSIS

History	*Stone or Cancer*			*Hepatitis or Cirrhosis*		
Occupation				+		+*
Previous operation	+		+	+		
Injections				+		
Diet	+					+
Alcohol		15%		25%		60%†
Gold arsenic cinchophen methyl testosterone chlorpromazine chemical poisons				+		+
Diarrhea			+	+		+
Fever	50%		20%		30%	
Pain	+	75%	+	+	25%	+
Weight loss	Absent or slow		Rapid			Slow
Pruritus	+		+			

* + = specific points in history of possible significance
† Percentages represent frequency of occurrence based on consensus of the literature and the author s experience

When the diagnosis is still doubtful after these studies, needle aspiration biopsy of the liver will often lead to an accurate pathologic or even etiologic diagnosis In selected patients the mortality associated with this procedure is considerably less than 1 per cent The few fatalities have usually followed the intercostal approach and have occurred in patients whose clotting time was prolonged or was not measured In cases where diffuse parenchymatous disease is present or where the needle can be inserted into a palpable liver nodule, needle biopsy of the liver has a high degree of diagnostic

TREATMENT The incidence of resectable tumors is not high All patients in whom the diagnosis is suspected, however, should be subjected to laparotomy, since it may not be possible otherwise to ascertain the cause of obstructive jaundice, and cholecystojejunostomy may afford considerable relief from icterus, pruritus, biliary cirrhosis, steatorrhea, and other digestive disturbances Carcinoma and pancreatitis are often associated, and may be difficult to differentiate even after the examination of frozen sections removed at operation Radical pancreatoduodenectomy is such a serious procedure, however, that it should not be carried out until a positive report has been obtained on a biopsy specimen Ravdin has reported 8 cases in which 5 year survivals followed pancreatoduodenal resection for carcinoma of the head of the pancreas (Kaufman and Wilson, 1955) The operative mortality associated with this procedure has varied from 11 to 50 per cent

Only a constant awareness of the possibility of pancreatic carcinoma will lead to an increase in the number of early diagnoses and resectable lesions

THE LIVER

Differential Diagnosis of the Causes of Jaundice

In the older age group, where there is a high incidence of complicating disease, previous surgery, injections, and transfusions antedating the development of jaundice, clinical differentiation of the etiologic factors is difficult The chief *intra*hepatic causes of jaundice are viral hepatitis, cirrhosis, and the dystrophies These cases are managed medically *Extra*hepatic jaundice is usually caused by gallstones or carcinoma and the treatment is surgical

It cannot be emphasized too strongly that the prolonged absence of bile from the gastrointestinal tract is well tolerated While it is true that a delay in performing needed surgery may carry some increased risk for elderly patients, it is best to temporize when the cause of jaundice is in doubt Most errors made in the differential diagnosis of jaundice are due to inadequate intervals of evaluation and failure to repeat studies and compare findings The incidence of gallstones and cancer is greatest in the decade between 50 and 60, while hepatitis and cirrhosis are most common between 40 and

Hepatitis

Most cases of acute hepatitis are due to the virus of infectious or homologous serum hepatitis Since the treatment of viral hepatitis is largely supportive, it is extremely important to rule out other causes of hepatitis, such as amebiasis, for which specific therapy is available

DIAGNOSIS The symptoms of discomfort, pain, and anorexia are due largely to hepatic swelling and vascular congestion The liver and spleen are generally enlarged and often tender Many of these patients give a history of injections, transfusions, or alcoholism Early in the disease the serum bilirubin will be elevated, the urine bilirubin and urobilinogen increased, and abnormalities found in the thymol turbidity or cephalin flocculation test

TREATMENT Bed rest is most important Restriction of activities should depend upon the presence or absence of jaundice, fever, or anorexia and the progress of the patient In mild cases the patient may be allowed to get up for meals and permitted bathroom privileges Persons in attendance should observe strict cleanliness of the hands, as well as syringe and needle sterilization

No attempt should be made to force feed patients with hepatitis Since the disease is usually mild and of short duration, there is no evidence that accessory vitamins or lipotropic factors are of value, although [illegible] given when p[illegible] taken, sweeter [illegible] herbert or sweetened milk supplement may be of help Fat is not contraindicated unless the caloric intake is excessive, the amount included in the diet should be governed by the patient's tolerance As jaundice and fever subside, malaise decreases, and appetite returns a simple, well balanced, unrestricted diet may be given

As the serum bilirubin falls toward normal levels and the patient's general condition improves, activity may be increased to a point short of fatigue If ambulation is hurried, relapses are more frequent and the patient is apt to have persistent fatigability, together with enlargement and tenderness of the liver It is wise to keep patients under observation until all symptoms have dis-

TABLE 17-3 PHYSICAL FINDINGS, PATIENTS WITH GALLSTONES CANCER, HEPATITIS, CIRRHOSIS

Physical findings	*Stone or cancer* 29% M, 71% F	72% M, 28% F	*Hepatitis or cirrhosis* 66% M, 34% F	
Enlarged liver	27%		73%†	
Enlarged spleen	26%		74%	
Gallbladder	11%	89%		
Tender liver			+*	+
Angiomas			12%	88%
Ascites	9%		15%	76%
Collateral circulation	9%		9%	65%
Phlebothrombosis		+		
Edema		+	+	+
Deficiency state				+
Palmar erythema			7%	93%
Fetor hepaticus			+	+

* + = findings of possible significance
† Percentages represent relation of finding *when present* to specific disease entity

TABLE 17-4 ACCESSORY STUDIES IN PATIENTS WITH GALLSTONES CANCER, HEPATITIS CIRRHOSIS

Laboratory procedures	*Stone*	*Cancer*	*Hepatitis*	*Cirrhosis*
Cephalin flocculation	0	0	+	+
Thymol turbidity	0	0	+	+
Serum albumin	N	N(75%), −(25%)	N	−(75%)
Cholesterol esters	N	N	N or −	−
Alkaline phosphatase	+	+	N	N
Urobilinogen	N	N to 0	+	+
Blood sugar	N	N or +	N or −	N or −
Response to vitamin K	N	N(89%)	N or −	−(91%)
Duodenal drainage	Crystals	Blood	N	N
Roentgenogram	Stone	Duodenal loop defect (50%)	N	Varices (15-50%)
Biopsy	Obstruction		Cellular involvement	

N = normal − = decreased
\+ = increased 0 = absent

accuracy The procedure is of particular value when more than one disease involving the liver is present In my own experience the needle aspiration biopsy has made possible an accurate preoperative diagnosis in about 95 per cent of the cases of jaundice associated with liver enlargement.

Hepatitis

Most cases of acute hepatitis are due to the virus of infectious or homologous serum hepatitis Since the treatment of viral hepatitis is largely supportive it is extremely important to rule out other causes of hepatitis such as amebiasis, for which specific therapy is available

DIAGNOSIS The symptoms of discomfort pain, and anorexia are due largely to hepatic swelling and vascular congestion The liver and spleen are generally enlarged and often tender Many of these patients give a history of injections transfusions, or alcoholism Early in the disease the serum bilirubin will be elevated the urine bilirubin and urobilinogen increased and abnormalities found in the thymol turbidity or cephalin flocculation test

TREATMENT Bed rest is most important Restriction of activities should depend upon the presence or absence of jaundice fever, or anorexia and the progress of the patient In mild cases the patient may be allowed to get up for meals and permitted bath room privileges *Persons in attendance should observe strict cleanliness of the hands as well as syringe and needle sterilization*

No attempt should be made to force feed patients with hepatitis Since the disease is usually mild and of short duration there is no evidence that accessory vitamins or lipotropic factors are of value, although intravenous glucose and accessory vitamins may be given when patients are unable to eat. When a partial diet can be taken, sweetened orange juice or mixtures of milk, gelatin and sherbert or sweetened milk supplement may be of help Fat is not contraindicated unless the caloric intake is excessive, the amount included in the diet should be governed by the patient s tolerance As jaundice and fever subside malaise decreases and appetite returns a simple well balanced unrestricted diet may be given

As the serum bilirubin falls toward normal levels and the patient s general condition improves activity may be increased to a point short of fatigue If ambulation is hurried, relapses are more frequent and the patient is apt to have persistent fatigability, together with enlargement and tenderness of the liver It is wise to keep patients under observation until all symptoms have dis

appeared and the liver function tests have become normal, so that diet and activities may be regulated. The physician must be careful, however, not to overemphasize persistence of abnormal liver function tests or insist on strict bed rest until all tests revert to normal. By so doing he may add to the patient's concern and retard his symptomatic recovery. Abnormalities in the liver function tests may be demonstrable long after complete clinical recovery has occurred.

In the more severe cases of hepatitis, increasing hepatic insufficiency is manifested by deepening jaundice, mental confusion, anorexia, and loss of interest in personal hygiene. At such times it is particularly important not to confuse the issue by sedatives that might produce similar symptoms. Occasionally a hemorrhagic tendency and a rapid decrease in the size of the liver may be noted as hepatic insufficiency increases.

In general, antibiotics are not considered of value in hepatitis. Where progressive signs of hepatic insufficiency are present, however, chlortetracycline hydrochloride, 250 mg. orally every 6 hours day and night, may help to decrease the amount of ammonia produced by intestinal bacteria. The doses should be given with meals, milk, or antacids not containing aluminum hydroxide or silicate (which interferes with absorption). When the illness is critical, the tetracyclines can be injected intravenously in doses of 0.25 to 0.5 Gm. at 12 hour intervals. Neomycin, in doses of 4 to 6 Gm. per day for 3 to 5 days, is also effective in depressing the production of ammonia by intestinal bacteria. Prolonged oral administration of antibiotics can result in the overgrowth of nonsusceptible organisms in the intestine, and continued therapy must be evaluated on the basis of the severity and course of the illness. The colon should be kept cleaned by saline laxatives or enemas of tap water or saline solution.

When anorexia is severe or vomiting is present, 1,000 to 3,000 cc. of a 5 per cent solution of dextrose with *maintenance* doses of the B complex, vitamin K, and ascorbic acid should be given daily by vein. Immune globulin (gamma-globulin) is of questionable value. The recommended dosage is 0.02 cc. per kilogram of body weight.

Steroids are not indicated in the mild cases. They may produce some improvement in appetite and decrease in icterus, but they increase the risk of gastrointestinal hemorrhage, mental disturbance, and activation of other infections. When patients fail to improve

and coma supervenes cortisone 100 mg three times daily or prednisone 25 mg three times daily should be used in an attempt to lessen the inflammatory disturbance in the liver Corticotropin in doses of 100 to 300 mg per day for as long as 10 days has also been reported helpful in instances of severe progressive hepatitis Antacids should be given concomitantly to combat the tendency to ulcer formation Attempts to lower the ammonia levels in the blood with intravenous arginine or sodium glutamate (25 to 50 Gm of either in 1 000 cc of a 10 per cent solution of dextrose in distilled water) have failed to produce consistent results Where hypo albuminemia and hypotension complicate the disease salt poor human serum albumin in doses of 100 to 200 Gm may be given daily for 5 to 7 days

One patient in 300 may show evidence of chronic or recurrent hepatitis following what is thought to be an initial viral infection In rare instances patients with viral hepatitis have a progressive downhill course with tissue necrosis and increasing fibrosis Needle aspiration biopsy should be considered when enlargement of the liver and spleen persists or when a cholangiolitic type of jaundice is present with abnormal liver function tests indicative of extra hepatic obstruction A rigid program of rest maintenance of the dietary regimen and the addition of vitamin supplements are in dicated for such patients Occasionally steroid therapy seems to be of value

Hepatic Coma

Hepatic coma may be precipitated in patients with hepatitis or liver damage by the injudicious administration of narcotics ex cessive sedation with long acting hypnotic drugs alcohol am monium chloride acetazolamide (Diamox) too vigorous diuresis paracentesis hemorrhage or superimposed infections The prog nosis is best in cases with a demonstrable precipitating factor that can be controlled The outlook is poor in cases of coma associated with progressive hepatic insufficiency per se

The prime factor in the ... be inability of ... bacterial decomposition not adequately clear the

appeared and the liver function tests have become normal, so that diet and activities may be regulated The physician must be careful, however, not to overemphasize persistence of abnormal liver function tests or insist on strict bed rest until all tests revert to normal By so doing he may add to the patient's concern and retard his symptomatic recovery Abnormalities in the liver function tests may be demonstrable long after complete clinical recovery has occurred

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The prime factor in the ...
be inability of
products arisin...
... a result of bacterial decomposition
In advanced hepatic disease the liver does not adequately clear the

blood of ammonia The neurologic status of the patient and the degree of coma correspond in rough fashion with the elevation of arterial ammonia It is apparent, however, that other still unrecognized substances play a significant role in hepatic coma since the concentration of ammonia may fall under therapy, without associated improvement in the clinical state Nitrogenous factors in the diet apparently provide metabolites that are involved in the pathogenesis of hepatic coma It is of interest that patients receiving methionine acquire an odor indistinguishable from fetor hepaticus

The stages of coma, as outlined by McDermott and Adam (1954) are as follows

Grade 1 Flapping tremor, lethargy, slurred speech, inability to perform problems, disorderly habitus, but no disorientation

Grade 2 The addition of disorientation and confusion, but with sphincter control

Grade 3 Incontinence and stupor from which the patient can be roused

Grade 4 Coma

TREATMENT At the first sign of disturbed consciousness, untidy habits, or undue somnolence the following measures should be instituted (1) dietary restriction of protein to 20 Gm or less (2) adequate evacuation of the contents of the colon particularly if there has been bleeding from the digestive tract (3) the administration of antibiotics to prevent the formation of ammonia by intestinal bacteria (4) maintenance of the circulating blood volume with intravenous infusions of 5 to 10 per cent glucose (5) the parenteral administration of *maintenance* doses of vitamins (6) transfusions as required to maintain blood counts within the normal range, (7) oxygen, (8) avoidance of all unnecessary sedation If restlessness is a problem chloral hydrate may be given rectally or soluble barbiturates hypodermically When the patient is in coma, oral medications may be introduced into the stomach through a simple plastic tube A Blakemore tube may be used if bleeding has occurred

Silen (1955) and Phear and Ruebner (1956) have indicated

that the most active ammonia producers among intestinal organisms are *Aerobacter aerogenes* and *Proteus morgani* and *mirabilis* Drugs reported to have the greatest effect on these organisms are neomycin (2 to 4 Gm ... (3 Gm daily)

The administration ... based on the amount of fluid lost, ... cubic centimeters The glucose provides a source of glycogen for liver protection, and partially satisfies caloric needs In the absence of edema, salt should be given in quantities sufficient to replace loss Serum potassium is usually low in patients with coma, particularly when some degree of ascites is present Hypopotassemia may be responsible for many of the symptoms associated with hepatic coma In addition, there is experimental evidence to suggest that regeneration of plasma protein will not occur in the absence of an adequate source of potassium The daily administration of 40 to 80 mEq of potassium chloride may be necessary to maintain normal levels The administration of blood to replace blood loss and combat anoxia is also essential

Where the situation is obviously desperate massive therapy with steroids may be tried, although the results are apparently not as effective in cirrhosis as in hepatitis

Recovery is dependent upon the extent of hepatic damage and to some degree upon whether coma is precipitated by exogenous or endogenous causes Current figures indicate a recovery rate as high as 50 per cent.

Cirrhosis

Cirrhosis of the liver ranks fourth among the leading causes of death in patients beyond the age of 50 Despite newer diagnostic techniques, many cases remain unrecognized until they are far advanced Among the factors responsible for this delay are the inherent latency of this disorder and a continued low index of suspicion among physicians Too often, the clinical findings of apathy, confusion malnutrition, and peripheral neurit... tributed to general ...
until
ment
appe...

PORTAL CIRRHOSIS Portal cirrhosis seems to be the result of a dietary deficiency, either a lack of specific essentials or a dietary imbalance complicated in some instances by infection or hepatotoxins Alcohol probably does its damage by producing a chemical gastroenteritis with associated reduction in food intake, or by altering the requirements for certain dietary essentials

The clinical manifestations and demonstrable degree of dysfunction depend upon the cellular damage, the activity of the cirrhotic process, and the degree of cellular regeneration Liver enlargement usually indicates fatty metamorphosis, nodular regeneration, or hepatic neoplasm The prognosis is poor in patients with advanced liver disease who have small or shrinking livers An excess of circulating estrogen, present in many cirrhotic patients as a result of hepatic insufficiency, is responsible for alopecia, palmar erythema, spider nevi, and in males testicular atrophy and gynecomastia Enlargement of the spleen may be associated with leukopenia, thrombocytopenia, anemia, and hemolytic tendencies

The remarkable regenerative powers of the liver often make it difficult to recognize the presence of functional insufficiency until extensive damage has occurred Liver function tests, however, will show a high incidence of abnormal findings Although the tests of liver function commonly employed measure only a few of the numerous vital functions and do not indicate specifically the type of liver damage, they do denote the presence of inflammatory or degenerative changes, interpreted in the light of other findings, they can be of tremendous value in diagnosis and prognosis The cephalin flocculation test and measurement of the bromsulfalein excretion serve as valuable screening procedures in nonjaundiced patients While these tests will uniformly reveal evidence of moderate to advanced functional impairment, they do not have the same prognostic value as procedures that test more primitive functions of the liver, such as the ability to synthesize albumin and to convert vitamin K to prothrombin The prognosis in the jaundiced patient with hypoprothrombinemia is poor if vitamin K given parenterally does not restore the blood prothrombin to normal levels The serum albumin level also bears a direct relationship to the severity of functional impairment In general, there is no absolute correlation between the histologic findings and liver function tests

Clinical signs and symptoms may also be unreliable as a guide to the severity and extent of hepatic damage in a given case The presence of an enlarged liver, however, may be regarded as a favorable prognostic sign, since hepatomegaly is frequently associated with fatty infiltration, a reversible abnormality In 40 per cent of the patients with enlargement of the liver, needle aspiration biopsies will reveal fatty infiltration Splenomegaly is of little prognostic significance While a completely accurate prognosis is not always provided by an analysis of the physical findings and laboratory data, the most significant and serious findings are ascites prolongation of the prothrombin time, hypoalbuminemia, and a small liver Derangement of liver function tests are next in importance The degree of jaundice bears a rough relationship to prognosis The prognosis becomes increasingly poor when blood loss and anoxia are superimposed as a result of hemorrhage or surgery

Prior to 1940 approximately one fourth of the patients with cirrhosis died as a result of hepatic insufficiency, and an equal number from infection or bleeding esophageal varices The remaining deaths were due to a variety of causes, some related to the cirrhosis (primary carcinoma of the liver, for example) and some unrelated Since 1940, as a result of the availability of antibiotics and the development of surgical measures to control hemorrhage, there has been a marked decrease in the number of deaths owing to infection and bleeding varices and an increase in the number of deaths owing to hepatic insufficiency

POSTNECROTIC CIRRHOSIS Postnecrotic cirrhosis is usually a sequel of viral hepatitis or chemical poisoning that causes massive collapse of liver tissue and condensation of stroma, producing a coarsely nodular liver It is more frequent during epidemics of viral hepatitis and is particularly apt to strike women in the postmenopausal period Clinical symptoms may be severe and associated with rapid progression of hepatic insufficiency

BILIARY CIRRHOSIS Biliary cirrhosis is the result of prolonged intrahepatic stasis resulting from a disturbance within the liver or obstruction in the extrahepatic biliary passages Inflammatory or metabolic disease, common duct stone, postoperative bile duct stricture and carcinoma are common causes Intermittent chills, fever, leukocytosis, and enlargement of the liver and spleen occur when

the obstruction is incomplete, as in common duct stricture or choledocholithiasis complicated by bacterial infection Recurring infection may ultimately result in multiple liver abscesses and death

TREATMENT Patients are benefited by diets adequate in all nutritional factors and containing 1 Gm of protein per kilogram of body weight, provided this amount can be tolerated Patients at bed rest or on limited activity may be maintained in positive nitrogen balance with as little as 40 Gm of protein per day High or even normal quantities of protein may be dangerous when extensive liver disease is present When coma seems imminent, protein may be reduced to 20 Gm or less A carbohydrate intake of 250 to 350 Gm per day, depending upon appetite and true body weight, is indicated Fats are limited only by the caloric intake desired and the tolerance of the patient It has been satisfactorily demonstrated that fatty infiltration of the liver will disappear when patients are taking an adequate diet containing normal amounts of fat

Patients who are unable to eat solids may be given a liquid diet using milk as a base and containing 2 to 4 raw eggs, 4 tablespoons of lactose, and 5 to 10 tablespoons of protein hydrolysate or concentrate, and flavored to taste with vanilla or chocolate It may be helpful to divide the daily caloric intake into 6 or 8 small feedings When patients are unable to eat, a 5 to 10 per cent solution of glucose in distilled water with added maintenance doses of water soluble vitamins may be given intravenously Choline (1 5 to 3 0 Gm daily), methionine (1 Gm daily), or Methischol (3 capsules three times daily or 1 tablespoon three times daily) may help to bring about a remission

The long range therapeutic program should include abstinence from alcohol and careful avoidance of potentially hepatotoxic substances such as acetylsalicylic acid, sodium salicylate, methyltestosterone, and chlorpromazine A multiple-vitamin preparation containing no more than the requirements recommended by the National Research Council may be given once or twice daily Accessory vitamins and lipotropic agents are of no value when patients are able to eat adequate diets The salt intake should be decreased to 3 to 4 Gm per day, provided the low-salt diet does not interfere with the patient's appetite Salt substitutes containing potassium gluconate, potassium chloride, and choline chloride may be used

The development and persistence of jaundice, anorexia, mental changes, or evidence of hemolysis or hypersplenism may be considered an indication for steroid therapy In prescribing such treatment, the potential hazards of fluid retention and gastrointestinal hemorrhage must be considered The adrenocortical preparations with minimal salt retaining effect—prednisone, methyl prednisone, or triamcinolone—are preferred The prophylactic administration of anticholinergic drugs and antacids, together with between meal and bedtime feedings, may prevent steroid induced ulceration and bleeding The simultaneous use of tetracycline (250 mg orally every 6 hours day and night) to prevent infection and decrease ammonia formation in the bowel is also of value at such times

Adrenocortical steroid therapy may be of value in instances of nonalcoholic cirrhosis of the posthepatic or cholangiolitic variety Such therapy often brings about an increase in appetite, decrease in jaundice, and improvement in the liver function tests Unfortunately remissions may not be sustained even under treatment

Oral or parenteral vitamin K or K_1 should be administered daily when bleeding is present or the prothrombin time is abnormally prolonged Vitamin K (menadione) may be given orally or intramuscularly in doses of 1 or 2 mg once a day, or the water-soluble form (Hykinone or Synkayvite) may be given in daily doses of 5 to 10 mg subcutaneously, intramuscularly, or intravenously If menadione is given orally, the dose should be accompanied by 1 to 2 Gm of bile salts Vitamin K_1 (Mephyton) may be given in a dose of 5 to 10 mg, repeated in 12 to 48 hours as necessary If surgery becomes necessary, 50 mg of Mephyton may be given by mouth 24 hours before operation, or by vein (in glucose) 12 hours preoperatively When Mephyton is given intravenously, the rate of infusion should not exceed 10 mg per minute

Where jaundice is present, 20 or more milligrams of vitamin K should be given daily with bile salts In most instances the ability to synthesize prothrombin is determined by the residual degree of liver function, and serves as a valuable aid in prognosis

COMPLICATIONS

Ascites The uniformly poor prognosis for cirrhotic patients after ascites appears has been noted in many excellent studies on the natural history of this disease In a series of 150 patients seen at

the Mayo Clinic between 1930 and 1938, 68 8 per cent of those having ascites failed to survive for as long as a year Ratnoff and Patek (1942), reporting on a series of 386 patients, also found that more than 60 per cent died within a year after the first symptoms of ascites

Ascites is the end result of a combination of circumstances relating to hepatic injury with diminished hepatic function Once ascites develops, protein is lost into the abdomen as a result of the exchange between the fluid in the peritoneal cavity and the blood plasma, the consequent reduction in plasma volume may stimulate secretion of the salt-retaining horm [illegible] centesis may thus aggravate the [illegible] whenever possible

Ascites should be managed conservatively Therapy is directed toward improving liver function and thereby lowering portal hypertension, and toward combating the hypoproteinemia by diet, restriction of salt, and procedures designed to increase the excretion of salt Mild ascites may respond to a medical regimen that includes diet and bed rest The most immediately helpful procedure in the management of ascites is a diet containing, if possible, not more than 0 5 to 0 2 Gm of sodium per day Mercurial diuretics in doses of 1 to 2 cc given 2 or 3 times a week are also beneficial Some of the newer compounds such as chlorothiazide (Diuril) also appear helpful but should be used with care

When the diuretic effect of mercurials becomes limited by the development of hypochloremia, it may be restored by the administration of 10 Gm of calcium chloride and 50 to 60 mEq of potassium chloride once a day for 5 days As long as the patient is under careful observation and the hazard of precipitating coma is understood, acidifying salts such as ammonium chloride may be tried in doses of 0 6 Gm 3 times a day in courses of 3 days, with rest periods of similar duration The hyperchloremic acidosis thus induced potentiates diuresis

When low sodium levels cause symptoms of drowsiness weakness, loss of appetite, cramps, decreased urine volume, and elevated nonprotein nitrogen, 1,000 cc of a 3 to 5 per cent solution of sodium chloride should be administered intravenously Large amounts of potassium may be lost, both as a result of muscle wasting and

following diuresis The marked weakness and lassitude of the cirrhotic patient is often due to hypokalemia

Salt poor albumin administered intravenously in doses of 50 to 100 Gm daily for 5 to 7 days may be of value in tiding a patient over a critical period The albumin rapidly enters the abdominal cavity however and the rise in osmotic pressure is neither sustained nor adequate Recent evidence indicates that the nonsalt retaining adrenal steroids may also be of value The presence of cirrhosis permits the accumulation of antidiuretic substances probably because of failure to inactivate aldosterone It is possible that the beneficial effects of the adrenal hormones lie in their depressing effect on cortical activity and aldosterone formation At this time the status of adrenalectomy is uncertain

Except when the abdominal fluid interferes with respiration or eating, paracentesis is to be avoided since it may remove badly needed protein lower the blood volume and blood pressure abruptly and decrease circulation throughout the body Coma may be precipitated by the combination of paracentesis and the preoperative administration of narcotics The intravenous injection of 1 or 1 5 liters of a 5 to 10 per cent solution of dextrose in water prior to paracentesis and again afterward may be of help in minimizing these complications

Since the development of cirrhosis is slow and progressive it is not to be expected that recovery will occur rapidly Therapeutic programs should be outlined for their long range effect It is not unusual however to see marked improvement within 4 to 6 weeks

Occasionally ascites is complicated by hernia Such patients tolerate surgery so poorly however that no elective procedures should be performed

Hemorrhage Hemorrhage occurs in approximately one fourth of the patients with cirrhosis and may be the direct or precipitating cause of death in as many as 50 per cent of the cases [illegible] result from [illegible]

the [illegible]

It m[illegible]

[illegible] of bleeding is not always demonstrable A review of the literature indicates that in approximately 80 per cent of the cases bleeding in known cirrhotic patients

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even make it possible to select patients for prophylactic shunts when the risk of hemorrhage is demonstrably high Despite the high mortality associated with the first hemorrhage however, pro phylactic shunting cannot be recommended in the light of our pres ent knowledge In 10 to 15 per cent of the patients varices will sub side completely on an effective medical regimen and probably no more than a third of the patients with varices ever bleed

Hemochromatosis

Most cases of hemochromatosis occur in males past the age of 50 who present the classical signs of cirrhosis ascites spider angiomas, and esophageal varices The condition appears to be primary, al though reports of hemochromatosis following numerous blood trans fusions appear well documented The possibility of homologous serum hepatitis in such patients cannot be ruled out

The diagnosis of hemochromatosis is not difficult when cirrhotic patients have associated diabetes and pigmentation of the skin The earliest presenting symptoms are weakness fatigue and occasion ally abdominal discomfort In some cases the finding of glycosuria or hepatomegaly on routine examination may give the first indica tion of trouble In others hemorrhage from esophageal varices may be the first manifestation In spite of the similarity to cirrhosis and the obvious stigmas of liver disease the diagnosis may be suspected when jaundice and anemia are absent or minimal and liver function tests are comparatively normal in spite of obvious clinical evidence of hepatic damage The best method of diagnosis in the early stages is by needle aspiration biopsy which shows large amounts of hemo siderin associated with nodular hyperplasia of the liver

The success of repeated phlebotomy is sufficiently encouraging to stimulate attempts at early diagnosis Blood may be withdrawn at weekly intervals and replaced by plasma to prevent protein de pletion Hemoglobin levels should be maintained between 12 and 13 Gm As the excess stores of iron are gradually depleted clinical improvement and a decrease in liver size may be noted

Cardiac failure due to excessive deposition of iron in the myo cardium may complicate the disease Hepatoma has also been re ported as a complication in 5 to 10 per cent of the cases a some what higher incidence than in portal cirrhosis

can be demonstrated to have its origin in varices. As many as 70 per cent of patients with advanced cirrhosis will have esophageal or gastric varices. The mortality associated with the first hemorrhage has been estimated to be as high as 30 to 35 per cent. Other sources of hemorrhage in cirrhotic patients include peptic ulcers and gastric erosions. The incidence of concomitant peptic ulceration in patients with cirrhosis is as high as it is in similar age groups in the general population, or possibly higher.

While it is important, for therapeutic and prognostic purposes, to ascertain the bleeding site, the immediate problem is hemostasis Esophageal tamponade with the Blakemore-Sengstaken bag may be lifesaving when bleeding is from esophageal varices. Its use permits the removal of gastric contents and the introduction of medications and liquid foods, while providing compression of the distal third of the esophagus and the cardia of the stomach. Other emergency measures include replacement of blood and general supportive therapy to prevent shock and anoxia; neutralization of the gastric contents; and the administration of mild saline purges or enemas to clear the digestive tract of blood. If the patient continues to bleed in spite of such measures, direct surgical ligation of the varices must be considered as an emergency procedure. When there is persistent bleeding distal to the tube, the possibility of gastric ulceration, varices elsewhere in the stomach, or bleeding unrelated to cirrhosis must be considered and attempts made to delineate the cause. Regardless of the source of hemorrhage, therapy should include the conventional measures employed in the treatment of peptic ulcer.

Findings that indicate a poor prognosis include hypoalbuminemia, hypoprothrombinemia which does not respond to the administration of vitamin K, any manifestations of encephalopathy, and the presence of a small liver. The outlook is also poor for patients who have failed to show any response to medical management, including diet, accessory vitamins, correction of fluid and electrolyte imbalance, transfusions, diuretics, and a low salt intake. Such patients will in all probability fail to survive surgery.

If the patient survives the first hemorrhage, a venous shunt should be considered as an interval elective procedure when his condition permits. Recent studies on the relationship of portal pressure and demonstrable varices to the frequency of hemorrhage may

cal examination, evaluation of the diet, blood, urine, and stool analyses, studies of gastric secretory function, liver function tests, roentgen examination of the entire digestive tract, sigmoidoscopy, and, where necessary, other endoscopic procedures

When one can be reasonably certain that symptoms are related to a disturbance of function rather than to active organic disease, regimentation of the patient's daily activity, with provision for adequate rest or relaxation, is indicated Other measures that may give relief from functional digestive symptoms include the use of a bland diet divided into small feedings, the avoidance of excessively hot or cold foods, and symptomatic therapy such as antispasmodics, accessory vitamins, sedation, and hormones in cases where hypothyroidism or other clinically demonstrable deficiencies exist

Constipation

Constipation is a frequent complaint of elderly patients Some use the term as denoting failure to have a bowel movement every 24 hours and in others it may indicate bowel consciousness to the point of concern over the volume, caliber, or consistency of the stool. The frequent association of general muscular atony with aging has led to the supposition that functional constipation in the aged is due to decreased tone of the colon Roentgen examination in such patients however, indicates good tone and peristalsis as a rule

The digestive residue ordinarily reaches the sigmoid colon about 24 hours following the ingestion of food Water is reabsorbed in the colon The accumulation of feces in the lower sigmoid and rectum stimulates reflexly the process of evacuation Since the gastrocolic reflex reinforces this stimulus, the after-breakfast interval is a favorable one for habitual bowel movement If the stimulus is ignored, the anal muscles contract, the fecal mass is retained, additional moisture is absorbed, and the remaining material becomes increasingly dry and impacted In many patients mild degrees of bowel dysfunction are due to changes in dietary habits and activity, inadequate fluid intake, poor bowel habits resulting from the neglect of stimuli the development of hemorrhoids, and too much reliance on laxatives

Most cathartics produce laxation by irritating the bowel Although evacuation results from the abnormal intestinal activity pro

Primary Carcinoma

Primary carcinoma of the liver is most common in dark skinned and Oriental races It is associated with cirrhosis in 75 per cent of the cases, and has the same sex distribution as cirrhosis, affecting men three times more often than women Autopsy statistics indicate that the incidence of primary carcinoma of the liver is 0 5 per cent

The symptoms are weakness, weight loss, abdominal pain, fever, nausea, vomiting, and change in bowel habits Enlargement of the liver is almost always present The spleen is enlarged only if the patient has cirrhosis The elevated alkaline phosphatase and, in the absence of jaundice, the abnormal bromsulfalein test are most helpful in suggesting the diagnosis Rapid enlargement of the liver, progressive jaundice, and pronounced physical deterioration in a patient known to have cirrhosis are also strongly suggestive signs Liver biopsy is usually required for diagnosis

The prognosis is extremely poor, although surgical removal of the lesion by partial hepatectomy may be successful Occasional patients live as long as one to three years without treatment

FUNCTIONAL DIGESTIVE COMPLAINTS

An adequately functioning digestive system depends upon co ordination between the autonomic nervous system and the muscular and glandular endowment of the digestive tract It may be said that the digestive tract outlives the body Contrary to general belief the tone, motility, and contractile power of the intestine and colon appear to be individual characteristics related to the individual's habitus rather than to his age

The relation of clinical symptoms to the recognized change associated with aging—gradual diminution in secretory activity as manifested by hypochlorhydria, achlorhydria and loss of pancreatic digestive ferments—is difficult to establish The older patient often has complicating factors such as loss of abdominal tone a tendency to gain weight, and associated developmental abnormalities such as diverticula and hernias

Every effort to eliminate the possibility of active organic disease must be made in elderly patients with digestive complaints Thorough diagnostic studies should include a careful history and physi

cal examination, evaluation of the diet, blood, urine, and stool analyses, studies of gastric secretory function, liver function tests, roentgen examination of the entire digestive tract, sigmoidoscopy, and, where necessary, other endoscopic procedures

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duced by the bowel's attempt to expel the cathartic, normal functional activity and regular habits are disturbed In addition, the normal 24-hour passage from mouth to rectum is disrupted The irritated, overstimulated bowel then becomes less responsive to subsequent irritation, and the condition is aggravated

Constipation in the elderly can usually be relieved by simple measures to correct the causes of bowel dysfunction the addition of adequate amounts of fruit and vegetables to the diet, including six to eight cooked prunes with breakfast, instruction regarding the importance of eating regular meals and having regular times for evacuation, and a fluid intake of two to three liters per day Generalized muscle weakness can often be improved by walking and taking simple exercises Attempts should be made to evacuate the bowel after a meal, preferably breakfast, in order to take advantage of the gastrocolic reflex Patients should be instructed regarding the constituents of an adequate diet, including fruit or fruit juice and a hot beverage for breakfast, and vegetables as a source of bulk at each of the other two meals It should be emphasized that constipation is most often the result of faulty habits rather than disease, and is complicated by the omission of proper foods from the diet

Careful instruction, emphasis, and persuasion will be needed for the elderly patient with constipation of long standing At the onset the use of small tap-water enemas or oil retention enemas at bedtime may help retrain the bowel to function properly When adequate bulk cannot be included in the diet, commercial forms of methyl cellulose taken in a full glass of water at bedtime, and again before breakfast if necessary, may be used

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CHAPTER 18

Diseases of the Genitourinary Organs in the Male and the Urinary Organs in the Female

FRED K. GARVEY

DISEASES OF THE KIDNEY

Pyelonephritis

In the aged primary pyelonephritis is rather unusual, but pyelonephritis as a secondary or intercurrent disease is fairly common. It may be a serious complication in diseases of the lower urinary tract. Arteriosclerotic kidney disease, along with obstructive uropathy, may lead to renal insufficiency and infection, a sequence often seen in patients with prostatism. Injudicious instrumentation of the lower urinary tract may touch off pyelonephritis, probably because a break in the mucosa allows organisms present in the urethra to get into the blood stream. The resultant bacteremia often initiates acute pyelonephritis or reactivates a latent, chronic form of the disease.

Acute pyelonephritis is an occasional complication of acute infections elsewhere in the body: in the respiratory tract, prostate, seminal vesicles or intestinal tract, for example. In most cases of this type, if there is no complicating lesion elsewhere in the urinary tract and treatment is adequate, healing takes place with very little damage to the kidneys.

There are two principal types of renal infections. One is a diffuse inflammatory process of the whole kidney, and is more commonly due to the Gram negative bacillary organisms. The other involves

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vention by intense treatment of acute pyelonephritis and meticulous follow up is of utmost importance

In chronic infections of the kidney it is important to eliminate if possible such complicating factors as stones obstructions and anatomic anomalies The infection should be treated diligently first with antibiotics and then by small doses of sulfonamide drugs until the infection is completely eradicated if possible Chemotherapy may have to be continued over a period of months and it is important to make frequent appraisals of the results during this time

Hydronephrosis and Hydroureter

In the aged hydronephrosis and hydroureter usually result from obstructive lesions distal to the kidney Intravesical obstruction from prostatism vesical neck contracture or urethral stricture may produce hydronephrosis and finally renal insufficiency Upper urinary dilatations resulting from lower urinary tract obstruction are usually bilateral but may be unilateral When infection complicates the picture there is considerable loss of renal function along with general malaise anemia loss of appetite and frequently cardiovascular complications

Diagnosis A history of difficulty in urination and dull costolumbar pain with or without febrile attacks should suggest upper urinary tract involvement There may be polyuria and thirst and the urine may have a low specific gravity If infection is present varying amounts of protein pus and bacteria may be found in the urine Presumptive evidence of hydronephrosis is usually afforded by renal function studies as well as by chemical blood tests for nitrogenous retention Intravenous urography should be definitive Cystoscopy should not be done unless the diagnosis cannot be made by intravenous urography

Treatment The bladder should be decompressed by urethral catheter or suprapubic cystostomy as soon as possible At the same time the patient should be protected against a flare up of pyelonephritis by antibiotic therapy or chemotherapy Fluids should be forced and the patient's need for electrolytes (as determined by chemical studies) should be supplied by infusions Anemia should be treated by transfusion followed by iron and vitamins as indicated Decompression of the bladder should be continued until

chiefly, the renal cortex. It is more commonly hematogenous in origin and caused by Gram-positive coccal organisms. Either type of infection may involve one or both kidneys.

DIAGNOSIS. The symptoms of acute pyelonephritis include a spiking type of fever, pain in the costovertebral angle, and vesical irritation. Pyuria is generally present in diffuse pyelonephritis but in cortical infections it may be either absent or scanty. Spasm and tenderness are usually present in the costovertebral angle and there is tenderness along the course of the ureter. When pyuria occurs the bladder symptoms may be predominant.

The combination of fever, pyuria, backache, and tenderness in the costovertebral angle should lead to a clinical diagnosis of pyelonephritis. A high leukocyte count helps to confirm the diagnosis and identification of the causative organism by smears and culture makes it positive. For purposes of therapy, the organism's sensitivity to various chemotherapeutic and antibiotic agents should be determined.

Neither cystoscopy nor intravenous urography should be done during the acute stage, as neither procedure would be very informative and instrumentation would actually be dangerous.

TREATMENT. General therapeutic measures include rest in bed and a high fluid intake. After the invading organism has been identified and the sensitivity studies completed, the selected drug should be administered in large enough doses to sterilize the kidney, if possible. As a rule, violent, acute infections of the kidney should first be treated by the antibiotic to which the organism is most sensitive, while less violent infections may be treated by chemotherapeutic agents, which usually have a broader spectrum than the antibiotics. Any one of these is given four times a day in the following dosage: antibiotics, 0.25 Gm.; sulfonamides, 0.5 Gm.; Furadantin, 50 mg. The newer soluble sulfonamides such as Gantrisin, Elkosin, and Thiosulfil are safer than the older, less soluble preparations and are equally effective.

After the acute stage is passed, a careful evaluation of the urinary tract should be done, and any complications or predisposing factors should be corrected. The goal in acute pyelonephritis is to eradicate the infection completely, in order to prevent the dire consequences of chronic pyelonephritis. Because chronic pyelonephritis is a more important cause of hypertension than glomerulonephritis, its pre-

vention by intense treatment of acute pyelonephritis and meticulous follow up is of utmost importance

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loss anemia and general weakness—symptoms of advanced malignant disease—and whenever metastatic lesions appear with no obvious primary site Pyelographic studies are warranted in such cases

An accurate diagnosis is possible in the great majority of renal neoplasms Roentgen examination with visualization of the renal pelvis and calices usually reveals the characteristic distortion of one or more calices An intravenous pyelogram may give presumptive evidence of a new growth, but in most cases it must be followed by

[illegible] of bladder Catheterization of the ureter may then be performed if it is indicated

Roentgenograms of the chest must be done routinely on all patients with renal tumors since the lung is the most common site of metastasis

TREATMENT The only cure for malignant renal neoplasms is removal of the affected kidney before metastasis has occurred Nephrectomy is often justified even after the tumor has metastasized particularly in patients with persistent pain or prolonged or recurrent massive hemorrhage

Except in rare instances roentgen therapy offers little aid In inoperable cases it may reduce the size of massive lesions and aid in the control of hemorrhage

Chemotherapy with nitrogen mustard or its derivatives is now being tried in conjunction with surgery and alone in cases where metastasis is far advanced So far there is little evidence of its therapeutic value

Urinary Calculi

Stone formation may be a primary disease or a complication of any of several diseases Its etiology is as yet unknown but primary stone formation is thought to be the result of some change or defect in body metabolism Multiple myeloma, renal tubular acidosis, acute osteoporosis hypervitaminosis D, Paget's disease, and sarcoidosis all have some relationship to calcium and phosphorus metabolism and may be complicated by stone formation Renal calculi are formed in about 60 to 70 per cent of the cases of hyper-

maximum improvement in the patient's general condition has been attained Then the primary cause of the hydronephrosis or hydroureter should be removed In cases where marked bilateral nephrosis is present, nephrostomies may occasionally be necessary because of the ureterovesical obstruction produced by bladder hypertrophy Inlying ureteral catheters are, more often than not, a hindrance to the patient's recovery.

Tumors

The renal tumor most commonly found in the older age group is carcinoma The average age of occurrence is around 50 Ninety per cent of the renal tumors are parenchymal and are adenocarcinomas, the most commnion of these being the so called hypernephroma or clear-cell carcinoma About 10 per cent of renal carcinomas arise in the pelvis of the kidney, later invading the renal substance or advancing along the ureteral lumen toward the bladder

Because of the late appearance of symptoms, the prognosis is poor in malignant renal tumors of any type The cure rate for parenchymal tumors is 15 to 20 per cent, that for pelvic carcinoma much less Metastases from hypernephromas are most commonly found in the lungs Renal pelvic, and ureteral carcinomas spread directly to adjacent organs by way of the lymphatics, and to remote parts of the body by the hematogenous and lymphatic routes

Diagnosis An unfortunate feature of renal tumors is their frequent failure to produce symptoms until the tumor mass has attained considerable size, and in some cases metastasized to another organ Painless hematuria is the earliest and most common sign, occurring in 60 to 70 per cent of the cases It is caused by invasion of the renal pelvis or by a vascular accident within the kidney, either of which indicates that the growth has existed for some time Pain is the next most common symptom of renal tumors, being present in about 50 per cent of the cases It is usually dull in character, unless ureteral clots produce colic In about 10 per cent of the cases the presence of a mass is the first complaint, although a careful history will usually bring out evidence of some previous pain or bleeding of short duration

Renal neoplasm should be considered in patients with weight

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An accurate diagnosis is possible in the great majority of renal neoplasms Roentgen examination with visualization of the renal pelvis and calices usually reveals the characteristic distortion of one or more calices An intravenous pyelogram may give presumptive evidence of a new growth but in most cases it must be followed by retrograde pyelography In patients with gross hematuria cystoscopy should first be done to determine whether the bleeding is from the ureter or bladder Catheterization of the ureter may then be performed if it is indicated

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parathyroidism, a condition that occurs occasionally in the aged Where this factor can be proved and the parathyroid adenoma removed, the patient will probably have no more trouble with urinary calculi The milk-alkali (Burnett) syndrome has many features in common with hyperparathyroidism It results from the prolonged intake of milk and an absorbable alkali, and is characterized by hypercalcemia, hypercalcinuria, and hyperphosphaturia Mild alkalosis, renal insufficiency, and calcinosis or nephrolithiasis may eventually develop

Stone formation is most common between the ages of 21 and 50 years In elderly patients stones of the upper urinary tract are usually the large staghorn type that have been present for many years They may produce no symptoms except loss of renal function and an accompanying pyuria

Stones may be secondary to other pathologic conditions of the urinary tract that produce stasis and infection, particularly infection with urea-splitting organisms The higher incidence of bladder stone in elderly patients may be attributed to the more frequent occurrence of prostatism, bladder diverticula, and bladder atony in this age group Small stones that pass from the kidney by way of the ureter into the bladder can normally be passed without difficulty through the urethra Hence bladder stones are seldom found without some evidence of infravesical obstruction

Ureteral stones may occur at any age Primary ureteral stones are rare Those originating in the kidney occasionally lodge in the ureter and may grow extensively, producing dilatation and loss of renal function

Diagnosis The large staghorn calculi seen most frequently in the aged may produce no symptoms other than a dull ache in the costovertebral region, accompanied by intractable pyuria The diagnosis is made by roentgen visualization of the kidneys, ureters, and bladder region by an anteroposterior view of the abdomen This usually shows the stone shadow and tends to localize it Then it is often possible, by intravenous pyelography, to determine the effects of the stone, so that a decision can be made as to whether or not it should be removed In the case of ureteral and vesical stones, cystoscopy and cystography should be employed in an effort to determine the cause and management

Treatment In persons beyond the age of 55 unilateral and

painless renal stones without accompanying infection are usually left alone Where both kidneys are involved and are definitely losing function at least one should be relieved of the stone and any cause of urinary stasis should be removed to prevent recurrence When renal function is in jeopardy age is no contraindication to surgery Lower ureteral and bladder stones may be removed either by transurethral instrumentation or by open surgery

DISEASES OF THE BLADDER

Because of its situation between the kidney and the prostate the bladder is exposed to diseases of both organs In addition to serving as a reservoir for urine the bladder acts as a cushion protecting the upper urinary tract in cases of urethral obstruction and prostatic enlargement or contracture As a result it often becomes diseased The bladder also acts as a sentinel and by exhibiting early and marked symptoms serves as a warning of disease in the neighboring genitourinary organs Vesical irritability is usually the earliest symptom produced by inflammation of the kidney or prostate gland in the male or of the posterior urethra in the female

Diseases of the bladder include malformations infections calculus formation neoplasms and neurogenic dysfunction Diverticulum is probably the most important developmental abnormality found in the aged

Diverticulum

Although diverticulum is associated with obstruction of the vesical neck in more than 80 per cent of the cases and is usually classified as acquired definite evidence of congenital origin can be found in many cases where no obstruction exists Even in the acquired cases weak areas in the bladder wall probably contribute a congenital factor to the formation of diverticula

Diagnosis Uncomplicated vesical diverticula produce no symptoms When symptoms occur they are due to infection or bladder neck obstruction In cases of infected diverticula the urine is purulent and may be thick and foul depending on the location of the sac and its ability to empty The diagnosis is made by cystoscopic inspection of the bladder lumen or by cystography using a contrast medium such as sodium iodide

TREATMENT. In cases of small diverticula with a comparatively large neck, simple removal of the obstruction at the vesical neck is usually all that is necessary for relief If the sac is large and infected, it must be removed along with the bladder neck obstruction

Nonspecific Infectious Cystitis

Primary cystitis is rare, since the normal bladder is highly resistant to infection In bladders that are diseased, injured, or unable to empty completely because of some associated lesion, however, infection may readily take place In the majority of cases cystitis is only a symptom, and demands a thorough search for the underlying pathology Diabetes mellitus, by lowering the resistance to bacterial invasion, predisposes to urinary infection Cord lesions that produce neurogenic bladder changes often cause cystitis, particularly when there is incomplete emptying of the bladder on voiding

In women cystitis is commonly the result of urethritis that extends to the trigone and the vesical neck Such infections often start with the beginning of sexual activity or with childbirth and smolder throughout life, with exacerbations at varying intervals Cystourethritis is probably one of the most common ailments of elderly women that can be explained on an anatomic basis The short length of the female urethra and its proximity to bacteria-laden areas, plus the occurrence of innumerable small glands in the urethra and vesical neck, make an ideal situation for infection Sexual activity reactivates low-grade infection involving these glands, which cannot completely recover between attacks Repeated attacks over a period of years may produce fibrosis and contracture of the bladder neck, resulting in urinary difficulty comparable to prostatism in the male Other possible causes of cystitis in women include cystocele (when the residual urine becomes infected), urethral diverticulum, neoplasm, stone, and pelvic inflammatory disease

Cystitis is less common in the male than in the female In men sa well as women the condition is usually secondary and indicates the presence of a pathologic condition in the upper urinary tract or the posterior urethra Obstructive factors such as prostatism, or

some intravesical lesion—diverticulum, neoplasm, or calculus—is the most likely cause

The organisms most commonly associated with cystitis are the coliform group Infections with the urea splitting organisms, *Bacillus proteus* and *Bacillus pseudomonas*, produce a strongly alkaline urine that causes marked irritation, excoriation, and occasionally encrustation of the bladder mucosa

DIAGNOSIS The patient with acute cystitis is exceedingly uncomfortable, with marked frequency and dysuria The latter is due to spasm resulting from attempts to empty the bladder completely Terminal hematuria is common Suprapubic pain or pressure is a frequent complaint in both acute and chronic cystourethritis Pyuria always occurs soon after the onset, but fever is not characteristic of cystitis

The diagnosis is usually evident from the symptoms, but the underlying cause is not as readily apparent After the acute phase has passed, cystoscopy and urography should be carried out in an effort to determine the etiology of the infection

TREATMENT The acute stage should be treated by chemotherapy rest, and antispasmodics Unless the infection is due to one of the urea splitting organisms alkalies should be given to relieve the burning After the acute symptoms have subsided a diligent search should be *made* for the underlying cause and treatment [illegible]

[illegible] lyps, and

Interstitial Cystitis

Interstitial cystitis is a long standing chronic lesion of the bladder occurring most frequently in women from 40 to 60 years of age It is rare *in men* The disease, which is of unknown etiology, is characterized by chronic inflammation of the bladder, with spasm contracture and thickening of its wall The lesion occurs most commonly in the roof and involves mainly the submucous layer which shows *infiltration* lymphedema, and increased vascularity with final fibrosis and loss of elasticity The mucosa becomes thin and breaks easily, producing ulcerations known as Hunner ulcers. Pyuria is uncommon

DIAGNOSIS The distressing day and night frequency, the oc

TREATMENT In cases of small diverticula with a comparatively large neck, simple removal of the obstruction at the vesical neck is usually all that is necessary for relief If the sac is large and infected, it must be removed along with the bladder neck obstruction

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epithelium, most tumors are of the transitional cell type About 5 per cent may be squamous or epidermoid in character, while adenocarcinoma rarely occurs Benign tumors of mesothelial origin are also rare in the bladder

Most transitional cell carcinomas are papillary growths that vary histologically from relatively benign, well-differentiated types to highly malignant, infiltrating masses that metastasize widely Because of their tendency to recur at the original site or elsewhere, all papillomas of the bladder are considered malignant regardless of the pathologist's report. Nevertheless, the histologic characteristics are of great importance from the standpoint of management and prognosis The less malignant the tumor, the less likelihood there is of rapid growth and invasion

With one exception, the etiology of bladder tumors is as obscure as the cause of cancer in other parts of the body The exception is those tumors that occur in workers who handle aniline dyes It is believed that the aromatic amines such as aniline and benzidine are definite carcinogenic agents that enter the body mainly through the lungs and cause cancer of the bladder in a high percentage of workers exposed over a long period These growths are histologically identical with other epithelial tumors of the bladder

Metastasis from carcinoma of the bladder occurs by way of the lymphatics and blood stream The tumor usually spreads first to the regional lymph nodes, then to the liver, lungs, and bony pelvis, in that order

Diagnosis The typical manifestation of bladder carcinoma is painless hematuria Since the hematuria is usually neither excessive nor continuous, its occurrence without other symptoms does not sufficiently impress the patient, nor too often, the physician Such complacency frequently leads to fatal delay in diagnosis and treatment The average duration of symptoms prior to the diagnosis of cancer of the bladder is one to three years Were it not for the bladder irritability, which results from sloughing and inf[illegible]on, in about [illegible]

[illegible]xcept in the [illegible] extensive growth necrosis, or a complicating infection with encrustation of urinary salts Loss of weight, anemia, and anorexia are symptoms that occur late and indicate extensive metastasis Massive growths involving the base of the bladder may

currence of suprapubic pain when the bladder is filled, and the absence of pyuria will almost make the diagnosis, which can be confirmed by cystoscopy The bladder capacity is markedly diminished, and pain and spasm occur when the bladder is filled Distention of the bladder causes breaks in the mucosa, with bleeding from the site of the lesion

TREATMENT There are many different means of treating submucous cystitis, few of which produce a cure They include irrigation with various chemicals, bladder stretching, hormonal therapy, fulguration, segmental resection, and in extreme cases urinary diversion Antispasmodic drugs such as Banthine and belladonna are of value Cortisone occasionally is effective A recent chemical Clorpactin, which is used as an irrigating solution, is the most promising agent at this time

Tuberculous Cystitis

This condition is more common in younger individuals, though it does occur in the aged It is always secondary to renal tuberculosis, and its treatment depends wholly on curing the disease in the upper urinary tract Like interstitial cystitis, it should be suspected whenever a bladder infection does not respond to the usual *methods of therapy used for nonspecific infectious cystitis*

DIAGNOSIS The symptoms are marked urinary frequency with dysuria and pyuria Urine cultures are negative The diagnosis is based on the cystoscopic finding of tuberculous lesions in the bladder, the demonstration of tubercle bacilli in the urine and the pyelographic evidence of renal tuberculosis

TREATMENT The renal involvement should first be treated by chemotherapy, nephrectomy, or both Bladder lesions then heal promptly under treatment with streptomycin, para aminosalicylic *acid, and isoniazid*

Neoplasms

Next to prostatic hyperplasia, tumors of the bladder are the most common neoplasms of the genitourinary tract They are more common in the male, and occur usually after the age of 50 Ninety five per cent are malignant growths, and of these, 95 per cent are epithelial in origin Since the bladder is lined with transitional

DISEASES OF THE PROSTATE GLAND

The prostate gland is subject to infection benign hyperplasia calculous disease and cancer The tendency to hyperplasia and cancer in later life makes this organ one of considerable importance in geriatric practice

Acute Prostatitis

Inflammation of the prostate may occur at any age Acute prostatitis is more common between 30 and 50 but it may occur in older men either alone or in association with benign hyperplasia and infections of the urinary tract Bacteria can invade the prostate by way of the blood stream or the lymphatics or by direct extension along the urethra The hematogenous route is most common Acute prostatitis begins as an acute inflammatory process involving the prostatic acini ducts and interstitial tissue It is most commonly a diffuse involvement but it may localize or progress to abscess formation

DIAGNOSIS The first urinary symptoms noted are burning on urination and increased frequency the usual symptoms of cystitis There may be rectal or perineal pain progressive difficulty in voiding, and within 48 hours pyuria and occasionally terminal hematuria General muscular aching chills and fever of 102° to 103° F usually precede by two or three days the local urinary symptoms This sequence accounts for the mistaken diagnosis of *influenza* often made in the early stage

In a patient with the above history who has no tenderness in the flanks or costovertebral angles the finding of a swollen hot tender prostate on rectal palpation usually makes the diagnosis evident. The two glass test of urine reveals gross pus in the first glass with less or none in the second It is important to make stained smears or cultures from the first specimen of voided urine so that a definitive diagnosis can be made and the proper drug selected for therapy

TREATMENT By meticulous and ~ the acute stage of prostat cations such as pyelonepl ... and epididymitis Overenthusiastic diagnostic procedures such as massage instru

obstruct the ureters and produce gradual renal insufficiency, with resulting uremia

The necessity of performing a cystoscopy in *every* case of hematuria is worth the emphasis of repetition When cystoscopic examination reveals a tumor, it is important to appraise its size, location and extent, and its relation to the ureteral orifices, trigone, and vesical neck Bimanual palpation of the bladder base through the vagina or rectum will reveal any thickening that might indicate extravesical tumefaction Often the grade of malignancy can be judged roughly by cystoscopic inspection alone, but it is important to take a specimen for biopsy (through the transurethral approach) in order to determine the histologic grade of malignancy The bite should be made deep into the musculature, since the depth of invasion is an important consideration in deciding on the proper therapeutic approach

Intravenous pyelography should be performed in order to rule out the upper urinary tract as the source of neoplasm and to reveal any pathologic changes that might have been produced by obstruction of the lower ureter When the tumor is large, the cystogram is very helpful in estimating its size

Cytologic examination of the urinary sediment is rarely of value, most tumors are obvious on cystoscopy

TREATMENT The complete and permanent removal of bladder tumors is the aim of treatment The therapeutic approach depends on the type of carcinoma and its extent, degree of malignancy, and accessibility When the growths are small, few, and relatively benign on histologic examination, fulguration is adequate if there is no evidence of infiltration Larger growths confined to one area of the bladder should be removed by segmental resection Extensive involvement of the bladder without deep infiltration necessitates complete cystectomy with transplantation of the ureters Where a highly malignant growth involves a large portion of the bladder and has extended through the bladder wall, some form of irradiation is indicated as a palliative measure

Unfortunately, the treatment of bladder cancer has not been too successful in general After an apparent cure has been obtained, follow up cystoscopic examinations must be done at frequent intervals over a period of years, so that any recurrence may be treated early

nence may result Intermittent hemorrhage related to episodes of congestion in the hyperplastic lobes may be brought on by chilling exposure alcoholic excess or sexual overindulgence Sudden acute retention may be produced by the same factors

When an overdistended bladder is found in a patient with a history of marked frequency and difficulty in voiding over a period of weeks chronic retention with a loss of renal function is to be suspected In such cases catheterization should be done only in the hosp tal where meticulous attention can be given to the cardio vascular and renal systems and every effort made to avoid the hazards of pyelonephritis with urinary suppression and renal fail ure Infection is usually present at this stage in prostatism and the least manipulation may precipitate renal insufficiency or an ex acerbation of infection Instrumentation should never be attempted in such cases

Ben gn Prostat c Hyperplas a

Hyperplasia of the prostate gland (so called "hypertrophy") is the pathologic growth of fibromuscular as well as adenomatous tis sue that begins in the periurethral portion of the gland Because of its anatomic location the growth produces progressive urinary obstruction leading gradually to back pressure in the bladder ureters and kidneys The end results of this process particularly if it is complicated by infection are marked urinary dysfunction and renal insufficiency

The cause of this condition which occurs in 34 to 40 per cent of men after the age of 50 is unknown There is undoubtedly some hormonal imbalance most likely involving the pituitary and testicu lar hormones This disease usually has an insidious onset and pro gresses slowly sometimes imperceptibly so that serious damage may be done before its existence is recognized Aging people have a tendency to accept mild difficulty in voiding discomfort and even pain as inevitable results of senescence and they often allow marked changes in the micturition pattern to occur before they complain Thus the problem may not be recognized until irreversi ble changes have taken place in the bladder or renal insufficiency has ensued

Bladder dysfunction is not necessarily related to the size of the hyperplasia Complete retention may be produced by a small

mentation, or endoscopy must be avoided until the acute and subacute periods have passed. The patient should have bed rest, copious amounts of fluid, and sedatives. Antibiotics or chemotherapeutic agents such as Furadantin or sulfonamides should be started even before the results of culture and sensitivity studies are obtained. If abscess formation occurs, perineal prostatotomy is indicated. After the febrile stage has passed, warm sitz baths relieve the discomfort associated with voiding and promote more rapid resolution of the inflammatory process.

Chronic Prostatitis

Chronic prostatitis is a very common disease, especially in men of middle age and beyond. It almost universally accompanies benign hypertrophy. Fortunately only a small percentage of the cases of chronic prostatitis cause noticeable symptoms or seriously endanger the patient's health. The most common symptoms are burning and frequency of urination, and suprapubic and low back pain. Usually pyuria is absent. Impotence and premature ejaculation are frequently related to chronic prostatitis.

TREATMENT. Of all the various forms of therapy, prostatic massage judiciously and conservatively administered is still the best treatment for the symptoms of chronic prostatitis. The empiric use of sounds still has its advocates, and occasionally seems to be effective.

Prostatism

Prostatism refers to the clinical condition that results when urination is obstructed by disease of the prostate gland. It is a condition almost entirely limited to men beyond the age of 50. The most frequent causes are (1) hyperplasia, (2) fibrous contracture of the vesical neck (bar formation), and (3) carcinoma of the prostate.

In general the symptoms of all obstructive conditions are similar. They consist of diminution in the force and caliber of the urinary stream, increased frequency, and hesitancy in starting the flow of urine. There may also be dribbling at the end of the act. When the frequency has increased to the point that the patient urinates every few minutes, a distended bladder is to be suspected. When the bladder is distended beyond its normal capacity, overflow inconti-

of the bladder Since chronic infection must exist for many years before it leads to fibrosis symptoms usually do not occur until after the age of 50

In patients with neurogenic disorders muscular hypertrophy resulting from bladder dysfunction may lead to bar formation This condition is often produced by spinal cord lesions resulting from multiple sclerosis tabes dorsalis or trauma

DIAGNOSIS The diagnosis of median bar is somewhat more difficult than that of prostatic hyperplasia since rectal palpation may reveal only presumptive evidence and endoscopy is necessary for a definitive diagnosis Endoscopic inspection reveals a rigid narrowed vesical neck with a definite elevation in its floor and the usual bladder changes associated with any infravesical obstruction of long standing hypertrophy of the trigone and ureteral ridges and general coarse trabeculations

TREATMENT Median bar can be relieved only by transurethral resection Either the punch operation or endoscopic resection using the high frequency current will give complete relief The condition is not amenable to enucleation as is benign hypertrophy

Carcinoma of the Prostate

Carcinoma of the prostate is the most common malignancy in the male It occurs in the same age group as benign hyperplasia and is frequently associated with it although the two conditions have no etiologic relationship It is rarely seen before the age of 60 but increases in frequency thereafter affecting probably 25 per cent of men in the seventh and eighth decades

The cause of prostatic carcinoma is not known but its growth is definitely influenced by sex hormones Androgen increases the rate of growth and the acid phosphatase level in the blood serum while estrogen therapy or orchiectomy slows the neoplastic growth and causes the acid phosphatase to fall to a normal level

Most carcinomas of the prostate originate in the posterior lobe although an occasional one is found in the new growth of hyperplasia The latter type is frequently cured by enucleation

The initial lesion begins as a small firm nodule on the posterior surface of the gland that can readily be felt by rectal palpation It gradually spreads within the capsule invading the other lobes and

median lobe growing into the bladder, which cannot be felt by rectal palpation. On the other hand, very large subvesical lateral lobes may exist without causing marked changes in the pattern of voiding or noticeable amounts of residual urine.

DIAGNOSIS. The diagnosis of prostatic hyperplasia can usually be made on the basis of the patient's history and age, together with the findings on rectal palpation and a careful estimate of residual urine. Urography, particularly a cystogram or cystourethrogram, will usually substantiate the diagnosis. Cystoscopy is often hazardous, particularly where the urine is infected, and should be avoided if possible.

TREATMENT. Once the prostate has begun to enlarge, there is no known therapy to retard the growth. The rate of hyperplasia varies considerably with different individuals, and some may never need operative relief. If the growth progresses to the point that serious local and remote changes are impending, surgery is indicated. Newer methods and better facilities have so greatly reduced the mortality associated with prostatic surgery that few patients should be denied the benefits of a needed prostatic resection.

Before operation, it is necessary to determine the patient's general physical status, and then to use every means possible to restore him to a state of well-being. Decompression by means of a catheter or suprapubic cystostomy should be followed by restoration of the electrolyte balance, proper hydration, improvement of renal function, control of infection, and relief of cardiac embarrassment. After all possible improvement has been brought about in the patient's condition, the mechanical obstruction may be relieved by one of many methods, depending on the size and location of the hyperplasia. About 70 per cent of prostatic enlargements are amenable to transurethral resection, a method that has a slightly lower morbidity rate, and appeals more to the patient. The method of operative approach is relatively unimportant in comparison with the preoperative preparation and postoperative management.

Vesical Neck Contracture (Bar)

Median bar is a form of prostatism that may occur at any age. True median bar results from long-standing infection of the prostate and vesical neck, with subsequent fibrosis and contracture. The resultant mechanical obstruction interferes with proper emptying

well as from hemorrhage and infection The roentgen findings in advanced carcinoma are those of metastasis to the hilar nodes of the lungs or typical osteoblastic lesions in the pelvic bones lumbar spine and heads of the femurs

As long as the growth remains confined to the prostatic capsule the serum acid phosphatase is usually within normal limits As the carcinoma spreads beyond the prostatic capsule the acid phosphatase level is usually increased in proportion to the amount of cancerous tissue present The normal serum acid phosphatase is 0.5 to 1 Shinowara unit, or 1 to 5 King Armstrong units In about 85 per cent of patients with advanced carcinoma of the prostate the serum acid phosphatase is elevated and this finding is pathognomonic of [illegible]

[illegible] activity in the body and hence is elevated in cases where bony metastasis has occurred Both the acid and the alkaline phosphatase tend to return to normal under estrogenic therapy or following castration

In early lesions where the only sign is an indurated nodule on the posterior surface of the prostate a surgical biopsy by perineal exposure is necessary for a diagnosis In more advanced cases the diagnosis can be made by transurethral resection of the obstructing tissue for examination by the pathologist

TREATMENT Carcinoma of the prostate *is* curable *if diagnosed* early enough for radical surgery *In 50 per cent of the* patients who have prostatic carcinoma apparently confined to the prostatic capsule a permanent cure can be expected from radical prostatectomy Unfortunately less than 10 *per cent of* the patients who come to urologists *with this* condition have lesions amenable *to cure by radical* surgery This lamentable fact emphasizes the *necessity* for *careful* palpation of the prostate gland in all *men* over *50 years of* age When the *clinician* feels an *indurated nodule in the* prostate he should suspect an early malignancy *and* refer the patient to a urologist for a definitive diagnosis *This* may require perineal exposure and examination of a *frozen section* If the nodule is found to be cancerous the entire *prostate* (including its capsule) the seminal vesicles and a portion of the bladder neck must be removed while the patient is still *on the* operating table This procedure can be performed either *perineally* or retropubically

the hyperplastic enlargement These nodules are very slow growing, and usually remain localized within the true prostate for two or three years before metastasis begins Later the tumor may extend into the seminal vesicles by way of the ejaculatory ducts, and may involve the pelvic lymph nodes by way of the perineural lymphatics Metastasis by way of the periprostatic veins, which drain into the vertebrals, explains the predilection of this tumor for the pelvic bones, heads of the femurs, and lower lumbar spine Later other bones of the body and also the viscera, particularly the lungs and liver, become involved by metastases

DIAGNOSIS Because early carcinoma of the prostate produces no symptoms, probably 85 to 90 per cent of the cases are not diagnosed until the flow of urine becomes obstructed and metastasis has occurred In advanced carcinoma of the prostate the obstructive symptoms are similar to those of benign prostatic enlargement Symptoms resulting from metastasis include pain in the lumbosacral region, in the hips, or down the legs, anemia and weight loss, and hematuria late in the course of the disease when the urethra is invaded Edema of one or both lower extremities is not uncommon when the pelvic lymph nodes have become greatly enlarged

Rectal examination is the most important procedure in the diagnosis of cancer of the prostate Papanicolaou tests are worthless in the early stages, and unnecessary in the later stages If all men past the age of 50 had rectal examinations at least once a year the cure rate for prostatic carcinoma could be greatly increased The lesion can be felt early, but must be differentiated from tuberculosis, chronic infection with fibrosis, and prostatic calculi In many cases an expert can make the differentiation on the basis of palpation alone, but other lesions require biopsy for a definite diagnosis A roentgenogram showing the presence of prostatic stones does not rule out carcinoma, since the two conditions may coexist

In more advanced cases the lesion is usually stony hard the gland is fixed in the pelvic sling and may be fixed to the rectum The seminal vesicles may be indurated and raised, and feel stony hard Less important signs that may be found in advanced cases include an enlarged, nodular liver, pathologic fracture and occasionally an enlarged supraclavicular node Anemia is often present, resulting from the replacement of bone marrow by tumor as

well as from hemorrhage and infection The roentgen findings in advanced carcinoma are those of metastasis to the hilar nodes of the lungs, or typical osteoblastic lesions in the pelvic bones, lumbar spine, and heads of the femurs

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Occasionally early carcinomas may be found in men so old or so debilitated that their life expectancy would not warrant the radical operation In such cases, and in cases where the lesion is extensive, the prostate fixed, and the serum acid phosphatase elevated, or where there is roentgen evidence of metastasis, palliative *antiandrogen therapy is indicated If obstruction is present, it* should be relieved by transurethral resection In about 85 per cent of the cases the androgens may be neutralized by either estrogen therapy or castration The latter has the advantage of being more positive in its effects and obviating the uncertainty of oral medication, since patients who do not tolerate estrogens well will sometimes decide to discontinue the drug Many of the estrogens are effective, but diethylstilbestrol, 5 mg daily, is the one most commonly given It is also the least expensive

Antiandrogenic therapy relieves pain within a few days, causes a definite regression of the primary growth within a few weeks, and in many instances brings about regression of the metastatic lesions in various parts of the body Patients usually gain weight and strength, and become less anemic The side effects of antiandrogenic therapy include impotence, gynecomastia, and occasionally edema of the lower extremities

Although this type of therapy is not curative, it affords marked relief of symptoms, improves the patient's general health and well being and usually doubles his remaining life span Occasionally life is prolonged for 10 to 12 years As a general rule, however, the effect of castration or estrogen therapy is limited to only a few years before the carcinoma becomes hormone independent This development is thought to be due to secondary androgens elaborated by the adrenals, and in such cases surgical adrenalectomy has brought definite remissions of varying duration The results however, have not warranted the routine use of such a radical procedure Medical adrenalectomy can be accomplished by the oral administration of cortisone, 50 to 100 mg per day in divided doses Salt must be restricted and potassium added to the diet in order to maintain the electrolyte balance

Some tumors are androgen independent from the start and in such cases antiandrogen therapy is ineffective Where bone metastasis has produced severe pain in the back and hips radiation affords some temporary relief

Prostatic Calculi

Stone formation is not infrequent in the prostate Most prostatic calculi are asymptomatic and are found incidentally on routine examination of the gland. Stones usually occur in association with benign hyperplasia, but are sometimes found in younger men who have chronic prostatitis Their etiology is not known

DIAGNOSIS The diagnosis is usually suspected when the rectal examination discloses stony hard, discrete nodules within the substance of the gland Calculi must be differentiated from the lesions of tuberculosis, cancer, and chronic fibrous prostatitis A definite diagnosis can be made by cystoscopy, x ray, or biopsy of the nodule If the process is not too far advanced, the stones can be removed by transurethral resection Where there is massive calcification, accompanied by marked urinary symptoms, perineal prostatotomy or subtotal prostatectomy is indicated

DISEASES OF THE URETHRA

The urethra is subject to many pathologic conditions, some of which are serious and difficult to correct In men the urethra, in addition to controlling and conveying the urine, plays an important part in sexual function The lesions most often affecting the male urethra in the *older patient* are inflammatory conditions, calculous disease diverticula, and injuries

Inflammations

Inflammations are the most common and important diseases of the urethra in both sexes The nature of the inflammation depends on the infecting agent In the past the gonococcus led the field, but recently nonspecific infections have become more common These include not only infections with the ordinary pyogenic organisms, but also *Trichomonas* infestations and such poorly understood inflammatory conditions as Reiter's syndrome, infection with L organism and amicrobic pyuria Tuberculous urethritis occurs rarely, but only when involvement of the kidney and bladder are so far advanced that the urethral infection is of relatively minor importance

Gonorrheal urethritis, though less common than in the past, is still seen in adult patients of all ages. In its early and uncomplicated stages 96 to 98 per cent of the cases can be cured promptly. Fortunately the gonococcus is unable to develop resistance to penicillin, as many other organisms do. Streptomycin and many other antibiotics are effective when penicillin is contraindicated. The criteria for cure are absence of discharge, a clear urine free of pus cells, and a negative culture from the urethral secretion.

Nonspecific urethritis in the male is most commonly caused by the *Staphylococcus albus* and the nonhemolytic streptococcus. Most cases probably are secondary to infection of the prostate gland, although primary urethral infection with a nonspecific organism does occur.

Both gonorrhea and nonspecific urethritis cause itching, burning on urination, and varying amounts of discharge. The two-glass urine specimen shows pus in the first glass, while the second glass is essentially clear. Smears examined with Gram stains will usually make the diagnosis evident.

Nonspecific urethritis, in the majority of cases, is resistant to all antibiotics and sulfonamides. Where the infection is coming from the prostate, treatment should be directed toward the gland. Although most cases run a short course and subside spontaneously, some are persistent and require local instillations of such an antiseptic as acriflavine or colloidal silver salts, or the empiric use of sounds.

Urethritis owing to the *Trichomonas vaginalis* may occur at any age, but is less common after 50. There is no specific treatment for it. The urethral instillation of antiseptics, together with oral chlortetracycline, will usually relieve the condition unless the prostate is involved In such cases massage is helpful.

Reiter's syndrome, L organism infection, and amicrobic pyuria are diseases limited almost entirely to young adults, and will not be discussed.

Nonspecific Urethritis in the Female

The proximity of the female urethra to the vagina exposes it to trauma in childbirth and coitus, with the subsequent danger of infection. Organisms from the vagina and rectum are responsible for the frequent occurrence of nonspecific urethritis in women.

The female urethra is homologous to the posterior urethra and prostate in the male About 80 per cent of women have persistent periurethral glands These may not function but if once infected they may perpetuate a smoldering low grade infection that often becomes activated from time to time throughout the patient s life

In the woman frequency and dysuria are the outstanding symptoms of urethritis Pain in the suprapubic and low back regions is another common symptom At the onset or with acute exacerbations there may be terminal hematuria The urine may or may not contain pus depending on the severity of the lesion The diagnosis is based on the history, the absence of fever, and the findings on urinalysis and endoscopy

Chemotherapy and bladder sedatives are necessary in the acute and subacute stages A favorite prescription in our clinic contains potassium citrate 30 Gm (1 ounce) tincture of hyoscyamus, 30 cc (1 ounce) elixir of phenobarbital 60 cc (2 ounces), with enough water to make 180 cc (6 ounces) The patient is to take 1 or 2 teaspoonfuls in water every 4 hours

The chronic stage is treated by urethral instillations and dilatations and in some cases by electrocoagulation of certain secondary pathologic changes such as cysts polyps and granulations

Injuries of the Male Urethra

Traumatic lesions of the male urethra must always be considered serious Minor injuries may heal without difficulty or complications, but extensive injuries are surgical emergencies requiring prompt attention

Trauma to the urethra usually results from straddle injuries fractures of the pelvic bone or injudicious instrumentation Ruptures of the urethra vary from minor lacerations to complete tears with separation of the two ends Injuries of the posterior urethra may cause extravasation of urine and blood into the perineum scrotum and perivesical spaces often leading to shock sepsis and death Wide incision and drainage is an emergency procedure to prevent death from sepsis and toxemia Prompt and thorough drainage of the exte-

of the urethra, a

Malignant Neoplasms

Malignant neoplasms of the urethra are rare in both sexes Those occurring in the male are usually squamous cell carcinomas arising from strictures of long standing In the female malignant growths are somewhat more common, and include both epidermoid carcinomas and adenocarcinomas The former result from chronic infection and stricture formation, while the latter arise from Skene's glands near the meatus Urethral cancers tend to grow along the urethral lumen and spread by lymphatic metastasis, involving both the inguinal and the pelvic lymph nodes

DIAGNOSIS Urethral carcinomas produce no characteristic symptoms in the early stages Hemorrhage and urinary obstruction usually occur late in the disease, depending on the size of the tumor and the amount of secondary infection present

TREATMENT In most cases nothing short of radical surgery is curative Complete urethrectomy with dissection of the inguinal glands is warranted in all but the very early cases This type of tumor is highly resistant to radiation

Benign Tumors

Benign urethral papillomas occasionally occur in both sexes This lesion is most common in the anterior urethra, and seems to be associated with moisture from a chronic discharge Intermittent bleeding may be the only evidence of this disease

TREATMENT Electrodesiccation usually cures simple papillomas The underlying cause should be treated to prevent recurrence

Caruncle

A urethral caruncle is a small, red, polypoid mass that arises in the meatus of the female urethra It rarely occurs before the age of 50, and apparently has some relation to the menopause Further evidence of its endocrine origin is the frequency with which it is accompanied by senile vulvovaginitis The lesion is benign Histologically it is composed of epithelium, blood vessels, and inflammation

DIAGNOSIS The common symptoms are bleeding and tenderness,

occasionally associated with frequency and dysuria The only means of making a definite diagnosis is by biopsy It is important to differentiate the lesion from carcinoma polyp condyloma and prolapse of the urethral mucosa

TREATMENT Surgical removal by excision or electrodesiccation is indicated Because of the association of urethral caruncle with senile changes estrogens should probably be administered after its removal to prevent recurrence

DISEASES OF THE PENIS

The most common diseases of the penis seen in men beyond the age of 50 are inflammatory lesions Peyronie s disease and neoplasm Inflammations include not only the venereal lesions such as chancre chancroid lymphogranuloma venereum and granuloma inguinale but also the nonvenereal lesions balanitis balanoposthitis and herpes progenitalis

Venereal Lesions

Chancre should be diagnosed only by dark field examination It needs no local treatment and if it is recognized before the serologic test becomes positive it can usually be cured by the intramuscular administration of 600 000 units of penicillin G daily for 8 days If the serologic test is positive bismuth subsalicylate should be administered once a week for 12 doses in addition to penicillin

Chancroid begins as a vesicopustule 3 to 5 days after exposure After it breaks down a painful ulcer is left There is very early involvement of the inguinal lymph nodes with painful swelling and occasional suppuration The offending organism is Ducrey s bacillus which can be readily recognized by direct smear or culture Chancroid responds fairly well to either oral or local sulfonamide therapy although streptomycin and tetracycline are probably more effective

Lymphogranuloma venereum begins as a small relatively innocuous appearing lesion on the penis which may disappear unnoticed Lymphangitis and lymphadenitis soon follow producing marked induration of the inguinal nodes and perilymphadenitis The diagnosis is made by the Frei test The condition can be cured

origin, and may be infectious They vary from small single warts to multiple, branching cauliflower growths In most cases they can be cured by the application of podophyllin powder (25 per cent) in oil Electrodesiccation gives relief more rapidly

Cancer of the penis occurs only in uncircumcised men, and usually after the age of 50 Chronic irritation by the smegma is apparently a factor in its origin Cancer of the penis starts as a small open sore that later ulcerates, or as a papillary mass involving either the glans or the foreskin The growth is slow and painless unless complicated by infection The inguinal lymph nodes eventually become involved both by malignant invasion and by infection

DIAGNOSIS Any penile lesion that gradually progresses despite antiseptic care should be examined by biopsy If any enlarged inguinal nodes are present, they should also be removed for biopsy

TREATMENT If the lesion is early and there is no evidence of lymphatic involvement, simple amputation of the penis is sufficient If lymphatic invasion is suspected, radical amputation with dissection of the inguinal and femoral nodes must be done The prognosis is good in early lesions, but after the lymph nodes become involved, 5 year cures are the exceptions

DISEASES OF THE SCROTUM AND ITS CONTENTS

Diseases of the scrotum itself are rare Tumors of the skin, chiefly epitheliomas may arise from occupational exposure to various carcinogens such as soot, tars, creosote, and petroleum products They metastasize to the superficial or deep inguinal lymph nodes The diagnosis is made by biopsy, and treatment consists in wide excision of the tumor and dissection of the inguinal nodes

Diseases of the testicle and epididymis are fairly frequent in men past 50 They include infections hydrocele, spermatocele, injuries, and tumors

Infections

Infections of the testicle are not common Those that occur may be blood borne but are more commonly extensions from an acute epididymitis In severe pyogenic orchitis the testicle is destroyed

by long term therapy with sulfonamides or antibiotics although strictures of the rectum and other types of scar formation may require surgery

Granuloma inguinale, although principally a disease of the tropics, is being seen with gradually increasing frequency in this country, chiefly among the colored race It is not a systemic disease, but consists of granulomatous lesions invading the skin of the genitalia and groins The diagnosis is made by finding the Donovan organisms in scrapings from the lesions Many of the antibiotics are effective against this disease but cures are slow

Nonspecific Infections

Nonspecific infections of the penis are limited almost entirely to balanitis and posthitis Phimosis and uncleanliness are the common causes Infection may be due to many types of bacteria some of which are very virulent and necessitate intense chemotherapy Antibiotic therapy is effective in all types of nonspecific infections of the foreskin and glans penis

Peyronie's Disease

This disease consists of single or multiple fibrous plaques on the shaft of the penis usually on the dorsum lying beneath Buck s fascia. It is seen only in patients beyond the age of 50 and the etiology is unknown The disease is often accompanied by Dupuytren s contracture

Diagnosis The first symptom is painful erection Later erection is associated with a crooked deformity or chordee that may preclude sexual intercourse

Treatment Various types of therapy including diathermy radiation vitamin E and cortisone have been used None is highly satisfactory In an occasional case surgical excision may give relief For palliation, x ray therapy is probably the most effective method available

Neoplasms

Except for venereal warts benign tumors of the penis are extremely rare Venereal warts or condylomas are probably viral in

Spermatocele

A spermatocele is a painless cystic mass containing sperm and lying above and behind the testicle It arises when there is malunion of the rete tubules and the epididymis Spermatoceles may be multiple and sometimes become large They are often confused by the casual observer with hydrocele Their position behind the testicle helps in making the differential diagnosis, since hydroceles form in front of the testicle Spermatoceles produce no symptoms except when they are large and heavy In such cases there is dull, dragging pain and pressure within the scrotum

Surgical excision is the proper treatment

Tumors of the Testicle

Tumors of the testicle are almost without exception malignant They are of three types seminoma, embryonal carcinoma, and teratoma Except when testicular tumors are complicated by hemorrhage and necrosis or when metastasis has occurred, a painless tumefaction is the only symptom Metastasis occurs primarily by way of the pelvic and abdominal lymph nodes Certain rapidly developing embryonal tumors may invade the blood stream early, with fatal results

Seminoma, which comprises about 35 to 40 per cent of testicular tumors, arises from the germ cells It is homogeneous in structure, and is the least malignant of all testicular tumors It is highly sensitive to radiation and the cure rate following simple orchiectomy and radiation is 70 to 80 per cent

Embryonal carcinoma has a variable histolo[illegible]

[illegible] and is re-

[illegible] It must be treated by radical orchiectomy with dissection of the retroperitoneal nodes, followed by massive radiation The expected survival rate is about 15 to 20 per cent

Teratomas may contain numerous types of immature and mature mesenchymal and epithelial structures, any of which may become malignant Occasionally a partially *formed* embryo is found within the testicle, and in such cases the growth remains benign Tera-

and suppurates, necessitating orchiectomy. Mumps orchitis produces pressure necrosis and atrophy, without suppuration.

Infections of the epididymis reach that organ by the blood stream or lymphatics, or by direct extension along the vas deferens from the prostate or seminal vesicles. Nonspecific organisms in variety are common offenders, and they produce both local and systemic reactions.

DIAGNOSIS. Fever, pain, swelling, and localized tenderness are the common presenting symptoms. In aged patients toxemia is common, and is sometimes overwhelming unless early relief is afforded.

TREATMENT. In the aged orchidoepididymectomy is indicated. In younger men the disease can usually be managed by conservative measures such as elevation of the scrotum, analgesics, and antibiotics.

Hydrocele

A hydrocele consists of a collection of fluid within the tunica vaginalis of the testicle. Except when it is associated with acute testicular lesions, its onset is gradual and painless and its cause unknown. Hydrocele is common in the newborn and in aging men.

DIAGNOSIS. Hydrocele appears insidiously as a painless, rounded, cystic mass surrounding the testicle. It transilluminates. A tense hydrocele may suggest tumor of the testicle, while large hydroceles high in the scrotum are sometimes mistaken for inguinal hernias.

Hydrocele sometimes accompanies chronic nonspecific epididymitis, tuberculous epididymitis, syphilis and tumor of the testicle, and all these conditions must be considered in cases of hydrocele. Aspiration of fluid allows better palpation of the testicle and epididymis and may be necessary for a more accurate diagnosis of the underlying pathology.

TREATMENT. Idiopathic hydrocele can be cured only by excision of the parietal tunica vaginalis. Palliation by repeated tapping and aspiration is often preferred by the patient, although it is associated with the hazard of hemorrhage or infection. The injection of sclerosing solutions is painful and unsatisfactory.

CHAPTER 19

Geriatric Gynecology

FRANK R. LOCK

Every gynecologist spends a considerable portion of his time dealing with problems of aging and aged women If the gynecologic problems arising in the postmenopausal period receive prompt and skillful attention, this should be a time in which the woman has complete comfort and normal function It is in geriatric patients that the most gratifying results may be obtained by appropriate gynecologic treatment

An understanding of the normal involutional processes in the woman is essential to recognition of abnormal changes The endocrine changes associated with aging are discussed by Grollman in Chapter 20 While diminished ovarian function results in cessation of ovulation and menstruation, in the normal menopause estrogen continues to be excreted in significant quantities over a period of years For this reason, dramatic symptoms and anatomic changes are limited almost exclusively to women suddenly deprived of ovarian function by operation or irradiation In most women objective evidence of active estrogen secretion for many years after the menopause is provided by the preservation of the labia minora, fullness of the labia majora, and elasticity, succulence, and cornification of the vaginal epithelium The uterus may maintain its usual functional size for a year or more after menstruation has stopped Other secondary sexual characteristics continue to show evidence of estrogen effect over a longer period of time Regression of the breasts, for example, and changes in the quality of the skin and hair are usually delayed for many years

Elderly patients frequently consult a doctor only when they are concerned about symptoms resulting from some chronic constitu-

tomas should be treated by a combination of orchiectomy and ir radiation The survival rate in patients so treated is about 60 to 65 per cent

Tumors of the Epididymis

Primary tumors of the epididymis are the least common neo plasms within the scrotum About 60 per cent are malignant growths, and these are about equally divided between carcinomas and sarcomas Unlike tumors of the testicle, malignant epididymal tumors commonly give pain They are usually small, but can be detected on routine examination The condition must be differenti ated from epididymitis

Orchidoepididymectomy, followed by radiation, is the proper treatment The prognosis is slightly better than in other intrascrotal tumors

periods of cyclic administration should be separated as widely as possible

Atrophic changes in the genital tissues occur in a gradual and progressive manner The normal changes include loss of most of the pubic hair and a decrease in the pigmentation and elasticity of the skin which assumes a texture and appearance comparable to that on the rest of the body The labia majora become flattened losing the rounded fat pad present in the functional years The labia minora gradually regress and in advanced age may be only a few millimeters in length immediately adjacent to the clitoris The degree of contraction of the vaginal orifice is determined by changes related to childbirth and by sexual activity The perineum and vaginal walls become somewhat inelastic The vaginal epithelium losing its rugae becomes smooth and thinned so that it has a soft red appearance Smears reveal lack of cornification in the surface epithelial cells The normal uterine size is approximately 5 by 3 by 2 cm The ovaries cannot usually be felt in the postmenopausal individual since they also undergo involutional changes and are only 2 by 1 by 0 5 cm. in size

Psychologic and sexual problems of the involutional years should seriously concern the physician For most married women the postmenopausal years coincide with those in which their children become adults and establish families and businesses of their own The mother s feeling of being needed and of making a major con tribution to the welfare of her family may disappear At the same time the aging process in her husband may cause him to become inattentive and to cease demonstrative evidences of affection In security and loneliness are two of many factors that contribute to emotional imbalance in women past the menopause

The sexual performance of women in the postmenopausal period is largely governed by their experiences in the functional years Women who have never enjoyed the sexual relationship may use the menopause as an excuse to discontinue coitus On the other hand those who have been happy and well adjusted in their marital relations may continue to have a happy and satisfactory sexual life into the eighth and ninth decades Sexual response and libido may actually be enhanced in women who have feared preg nancy and in those who have had some distaste for contraceptive practices (Contraception may be safely discontinued one year

tional disease Because the physician's attention is focused on the patient's complaints, it is not unusual for years to pass without the performance of a general physical examination Good medical care requires a general examination of the areas most susceptible to carcinoma at intervals of six months, even though the patient has no symptoms referable to these areas The breasts, pelvis, rectum and skin should be watched carefully.

DISEASES OF THE BREASTS

Any mass or inflammatory change in the breast of the postmenopausal patient *should be considered due to cancer until proved otherwise* The benign functional diseases of the breast, such as chronic cystic mastitis, which may be so troublesome in younger women, invariably disappear after the menopause Hypertrophy of the breasts sometimes follows the administration of estrogens, causing marked discomfort to the patient, this is an indication to discontinue the hormone Acute mastitis is a rare complication of viral diseases in elderly women, and subsides spontaneously

FUNCTIONAL CONDITIONS AND PSYCHOLOGIC PROBLEMS ASSOCIATED WITH THE MENOPAUSE

The menopausal syndrome is a self limited condition It is generally accepted that vasomotor phenomena, usually described as hot flashes, are frequently associated with the climacteric Although many additional bizarre and nonspecific symptoms are attributed to the menopause, they occur with equal frequency in association with emotional instability and tension states at all ages

In the normal course of events symptoms related to the climacteric follow a course of exacerbations and remissions In the normal untreated individual the periods of remission gradually increase in length, and the symptoms disappear within eighteen months While it is difficult to evaluate persistent symptoms in women of advanced age who have received estrogens regularly over a period of years, it is very doubtful that vasomotor symptoms in women more than 5 years past the menopause are based on endocrine imbalance Most gynecologists agree that estrogens should rarely be administered for periods of more than 3 weeks, and that the

rectovaginal as well as a bimanual vaginal examination No examination of such a patient is complete until a uterine sound or probe has been passed through the cervix to determine its patency, and to learn whether or not fragile tissues in the cervical canal or uterus will bleed following withdrawal of the instrument The escape of bright blood from the cervix or uterine canal following this procedure (Clark s sign) is highly suggestive of a malignant lesion

The value of Papanicolaou smears is directly dependent upon the accuracy of the laboratory available to the physician Although improved techniques and increasing numbers of expert cytologists have enhanced the value of this test it cannot yet be considered a valid criterion for proving or ruling out the presence of pelvic malignancy The Papanicolaou technique is of limited value in the diagnosis of carcinoma of the endometrium fallopian tube and ovary lesions that are common causes of postmenopausal bleeding

Unless the history or physical examination discloses some definite explanation for postmenopausal bleeding dilatation and curettage should invariably be carried out in combination with adequate biopsy of the cervix The fact that a patient has received estrogens or that atrophic vaginitis is present must not lull the physician into a *false* sense of security While definitive diagnostic procedures such as dilatation and curettage may occasionally be briefly deferred in such cases the patient should be kept under careful observation until the absence of malignant disease is definitely established

Carcinoma of the Vulva

Squamous cell carcinoma is the most common malignant lesion of the vulva Basal cell carcinoma, malignant melanoma and carcinoma of Bartholin s gland occur infrequently The most frequent presenting symptom in carcinoma of the vulva as in many benign vulvar lesions is pruritus

Malignancy of the vulva is often related to chronic vulvar lesions that may have been present for years Every chronic lesion of the vulva should be examined by *biopsy* and examined repeatedly if superficial ulceration is observed When chronic lesions fail to respond to conservative measures malignant change should be suspected

after menstruation has ceased.) Whenever gynecologic surgery for a benign condition is being considered in a patient past the menopause, one should first determine whether or not she still has an active sexual life.

Dyspareunia rarely develops in patients who continue a normal sexual life. Prolonged abstinence, however, will permit progressive constriction of the introitus, so that the patient experiences dyspareunia when sexual activity is resumed. This problem can be overcome within two weeks by the daily insertion of one vaginal suppository containing 0.5 mg. of stilbestrol.

MALIGNANT DISEASES

Evaluation of Postmenopausal Bleeding

Postmenopausal bleeding is defined as any bleeding from the vagina that occurs a year or more after menstruation has ceased. The seriousness of this symptom is indicated by studies which have shown that malignant pelvic lesions exist in 25 to 50 per cent of the patients with this complaint. Although the higher figure represents TeLinde's experience in 1940 prior to the widespread injudicious use of estrogens, the 25 per cent incidence of pelvic malignancy was discovered by Brewer and his associates (1954) in current medical practice.

A patient who presents herself with the complaint of slight vaginal spotting should always have a thorough evaluation. If this reveals no objective cause for the bleeding, it should be repeated after a short interval.

The first step in such an evaluation is a thorough pelvic and rectal examination. Gynecologists begin their examination with careful inspection of the external genitalia, including the anus and urethral orifice as well as the vulva and introitus. A speculum is then introduced, and with the aid of a bright light the entire vagina and cervix are thoroughly inspected. Care should be taken to expose the anterior and posterior vaginal walls by turning the speculum, or to observe them carefully as the open speculum is slowly withdrawn from the vagina. Because a lesion in the cul de sac, ovaries, or uterosacral ligaments is often obscured by the inelastic walls of the vagina or by obesity, it is important to perform a

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In 1955 and 1956, 94 per cent of the patients admitted to the North Carolina Baptist Hospital for treatment of carcinomas of the cervix had early lesions League of Nations Stage II or less It is now common practice to perform a biopsy of the cervix when there is the slightest discoloration or ulceration The common use of the Papanicolaou smear has also led to the diagnosis of many preclinical carcinomas of the cervix before any visible lesion was present. Although carcinoma of the cervix is predominantly a disease of late middle life—the average age for its occurrence being 46 years—it persists as the most frequent malignant lesion encountered in women of all ages

Intraepithelial (preinvasive) carcinoma of the cervix may be treated by total hysterectomy with salpingo oophorectomy, provided that a wide segment of the adjacent vagina is also removed and the presence of invasive carcinoma is ruled out by serial block study of a wide cone of cervical tissue. In debilitated patients treatment by a wide conization of the cervix, followed by careful observation is justified Intensive irradiation represents excessive and dangerous treatment for intraepithelial carcinoma in any patient

Invasive carcinoma of the cervix is an indication for treatment with a combination of intrauterine and interstitial irradiation with external roentgen therapy to the lateral pelvic tissues Keen judgment may be required to determine the proper amount of roentgen treatment in elderly individuals There is no place for limited operative treatment in invasive carcinoma of the cervix Elderly patients are rarely, if ever, candidates for the radical Wertheim hysterectomy with regional lymphadenectomy, which is now used in some areas as primary treatment for carcinoma of the cervix

Carcinoma of the Endometrium

Adenocarcinoma of the endometrium is the most common malignancy of the uterine body It should be strongly suspected when postmenopausal vaginal bleeding occurs, and its frequency justifies the recommendation of dilatation and curettage for every woman who has postmenopausal bleeding that is not adequately explained Prolonged estrogen therapy has often been indicted as an etiologic factor in endometrial carcinoma While this charge has not been

Carcinoma of the vulva should be treated by radical vulvectomy and block removal of the regional lymph glands In reasonably early cases the prognosis for cure is excellent Irradiation is seldom indicated in the treatment of these lesions The ability of elderly and even somewhat debilitated patients to withstand this extensive operation is amazing In our experience it has been performed successfully usually as a two stage procedure in a considerable number of patients 75 to 85 years of age Even in advanced cases with extensive ulcerative carcinoma of the vulva radical vulvectomy is frequently justified as a palliative measure Patients are often pathetically grateful for the elimination of a foul and painful ulcerative lesion

Carcinoma of the Vagina

Primary carcinoma of the vagina is rare and is invariably squamous cell in type Metastatic lesions from carcinomas of the cervix and endometrium are relatively common in the vagina however and the vaginal vault is the most frequent site of recurrence after cervical or endometrial carcinoma has been treated surgically In patients who have been treated for pelvic malignancy any slight vaginal lesion should be examined by biopsy since the opportunity for successful treatment of a recurrence by surgery or irradiation depends upon the extent of the lesion when a diagnosis is made Such patients should continue to have regular follow up examinations as long as they live Recurrence of carcinoma in the vaginal vault has been observed in our clinic as late as fourteen years after treatment of the primary malignancy

Although there is no reasonable anatomic explanation metastasis to the vagina may occur from malignant lesions in distant sites such as the small bowel A small focus of adenocarcinoma in the vagina should lead to an intensive search for the site of the primary lesion even though the prognosis is poor

Carcinoma of the Cervix

More than 90 per cent of the primary malignancies of the cervix are squamous cell carcinomas An alert profession has completely reversed the ratio of early and late lesions at the time of diagnosis

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Although there is increasing evidence of the desirability of removing the regional lymph glands at the time of operation in patients with endometrial carcinoma many elderly patients cannot tolerate such extensive surgical procedures The vaginal approach may permit removal of the uterus, tubes, and ovaries in patients who could not withstand an abdominal procedure It is recognized that vaginal operations are a compromise that allows treatment of women who are poor risks because of extreme obesity or constitutional disease

Carcinoma of the Ovary

Carcinoma of the ovary is an insidious disease and the patient often has extensive ascites before she seeks medical attention Early diagnosis of this condition is made so infrequently that only 15 per cent of the patients survive for 5 years or more If the mortality from ovarian carcinoma is to be lowered a careful pelvic examination must be a part of the general physical examination of every woman regardless of her age and prompt operative removal of the pelvic organs must be urged when an enlarged ovary is found There is no place for conservative observation of a post menopausal patient with enlargement of one or both ovaries

Although uniform agreement about the use of irradiation does not exist, total abdominal hysterectomy and bilateral salpingo-oophorectomy is the treatment of choice whenever an operation for ovarian disease is performed in a postmenopausal woman If fluid is present in the peritoneum a sample should be submitted for Papanicolaou studies When no free fluid is found peritoneal washings can be studied by the Papanicolaou technique The presence of cancer cells is an indication for irradiation even though the malignant lesion seems to have been removed intact Under these circumstances many clinics employ the intraperitoneal introduction of radioactive colloidal gold (Au^{198}) and this technique has also been helpful in the control of ascites resulting from peritoneal carcinomatosis Chemotherapeutic approaches to the management of ovarian carcinoma have been somewhat disappointing but the administration of nitrogen mustard and other new agents may at times prove palliative

fully substantiated, the history of many years of continuous estrogen therapy is frequently associated with this lesion For this reason dilatation and curettage should not be long delayed, even though the physician is under the impression that the bleeding is due to estrogen therapy

Papanicolaou smears are unreliable for the diagnosis of endometrial carcinoma, although their accuracy is improved when smears are obtained directly from the endometrial cavity by aspiration or lavage Nevertheless, in present practice these techniques are primarily research tools, and standard diagnostic procedures *must still be employed*

When an early diagnosis is made, the prognosis for cure of endometrial carcinoma is excellent Miller's good results (1940) were obtained in a group of patients who had had symptoms over an average period of eleven months The pelvic findings, particularly the size of the uterus, afford the best index of the extent to which the lesion has progressed When the uterus is no larger than that normally encountered during the functional years of a woman's life, the prognosis is usually excellent Further important information is obtained at the time the diagnostic curettage is performed, when the surgeon should determine the extent and location of the lesion by first gently exploring the endocervix and lower uterine segment and then proceeding to each wall of the uterus individually Extension of the tumor to the endocervix and cervix is an unfavorable prognostic sign, because of the heavy lymphatic drainage *from these tissues Cavitation of the uterine wall indicates in*filtration by the malignancy, and a less favorable prognosis

Although there has been a recent controversy concerning the use of irradiation in the treatment of endometrial carcinomas, the accumulated literature shows a consistent improvement in results where irradiation and operative treatment are combined Total hysterectomy and bilateral salpingo oophorectomy should be employed in the treatment of every patient with endometrial carcinoma, unless her condition absolutely contraindicates operative treatment Most of the experts in the treatment of malignant pelvic disease agree that intrauterine radium prior to operation is the treatment of choice *External roentgen therapy is usually reserved* for the treatment of metastatic lesions found at operation

Although there is increasing evidence of the desirability of removing the regional lymph glands at the time of operation in patients with endometrial carcinoma, many elderly patients cannot tolerate such extensive surgical procedures The vaginal approach may permit removal of the uterus tubes, and ovaries in patients who could not withstand an abdominal procedure It is recognized that vaginal operations are a compromise that allows treatment of women who are poor risks because of extreme obesity or constitutional disease

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BENIGN NEOPLASMS

The benign neoplasms most frequently encountered in geriatric gynecology are uterine fibroids and ovarian cysts The involutional changes in pelvic organs that occur in the postmenopausal period bring about a resting state of the uterus and ovaries Normal postmenopausal organs have been described above and are much smaller than the same organs during the functional years of a woman's life This regressive change applies to benign uterine fibroids which are composed of uterine muscle as well as fibrous tissue One does not expect growth of a benign tumor under these circumstances The possibility of cyst formation in the ovary on the basis of abnormal follicular function or failure of a retrogression of a corpus luteum is eliminated by the absence of hormonal stimuli present in the childbearing years and by a comparatively unresponsive state of the ovary related to the aging processes

Uterine Fibroids

Uterine fibroids occur in 30 per cent of women at the menopausal age and cause irregularity of the shape of the uterus in a relatively large number of older women Moderately large uterine fibroids observed at or near the menopause may be followed, provided the physician is certain of his diagnosis, with the expectation that they will become much smaller as the years go by On the other hand, definite growth of a uterine fibroid in a postmenopausal woman is an absolute indication for its operative removal The incidence of sarcoma in uterine fibroids is relatively low, but sarcomatous change can occur at any age and must be suspected when growth of a uterine tumor occurs in the older patient

Ovarian Disease

The cystic neoplasms of the ovary most commonly observed in elderly women are pseudomucinous cystadenomas and serous cystadenomas Solid tumors of the ovary in older patients are almost invariably malignant

Since simple cysts do not occur in the postmenopausal patient, there is no place for medical treatment, the presence of a significant

cystic enlargement of the ovary is a clear cut indication for operation There is no reliable method for differentiating benign and malignant conditions of the ovary

Pseudomucinous and serous cystadenomas are often multilocular and the septa that separate the compartments may cause their surfaces to be somewhat irregular It may be difficult at times to differentiate between a very large ovarian cyst and extensive ascites Resonance at the flanks can often be demonstrated in patients with ovarian cysts, while in cases of ascites a flat plate of the abdomen with the patient in erect position may demonstrate fluid in the abdomen

Paracentesis is absolutely contraindicated in the presence of an ovarian cyst, as it may cause the implantation of malignant cells in the peritoneal cavity In cases where doubt persists in spite of all diagnostic studies, a small abdominal incision performed under local anesthesia will permit an accurate diagnosis Whenever a period of preparation and observation is necessary prior to major surgery, this procedure provides extremely important information with less risk to the patient than a paracentesis

Since ovarian lesions are frequently bilateral, bilateral salpingo oophorectomy must always be performed Hysterectomy will add little risk in the hands of an experienced surgeon, and should also constitute a part of the treatment of these lesions

BENIGN VULVAR DISEASES

Chronic vulvar lesions are common in postmenopausal patients Many of these women do not consult a doctor before the lesion has been present over a period of many years and has progressed until the skin of the entire vulvar and perianal area is involved and symptoms are almost intolerable The [illegible] vulvae and ani Scratching a [illegible] often leads to marked hyper[illegible] of all the skin of the vulva

Infections and Allergic Reactions

Acute and intermittent pruritus is often the result of infection or allergy The vulvar infection encountered most frequently in elderly women is monilial vulvovaginitis The severe grades of this

BENIGN NEOPLASMS

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is made to re establish sexual function after a period of abstinence The management of such cases has already been described

Chronic hypertrophic vulvitis is characterized by diffuse thickening of the skin in the involved areas together with a loss of elasticity a slight loss of pigment and mild edema of the subcutaneous tissues The margins are not sharply delineated, and the appearance of the involved skin differs little in other respects from that of the adjacent tissues Superficial excoriation is commonly present but ulceration does not occur

Leukoplakia is characterized by bilateral symmetry of the lesion It is often described as a butterfly lesion and the lateral limits may extend to the medial surface of the thighs In early lesions the skin is reddened and soft in appearance In older lesions the skin becomes white and hypertrophied and in the advanced stage atrophic changes lead to thinning of the tissues

Kraurosis according to many descriptions is a nondescript lesion of the vulva This term along with leukoplakia is commonly applied to all types of vulvar disease In my experience kraurosis is characterized by atrophy and shrinking of the skin of the vulvar and perianal region The tissues become fragile and lose all pigmentation Numerous areas of linear excoriation may be present, but this is not a consistent finding The principal characteristic is a sharp linear demarcation of the involved skin from the adjacent normal skin

Lichen sclerosus et atrophicus is a diagnosis that can be made only by microscopic examination of a biopsy specimen

Involutional anal stricture is an extremely common lesion in women beyond the age of 50 In this condition the anus will not admit an examining finger without extreme discomfort to the patient The stools are small in caliber and the patient usually has to take laxatives regularly This condition sometimes develops spontaneously though it often follows anal operations such as hemorrhoidectomy or the regular use of cathartics

Treatment

Definitive treatment of any benign disease of the vulva must be based upon an accurate diagnosis Measures designed to allow the lesion to return to a baseline condition however, should be

condition are associated with diabetes, and the principal therapeutic approach is through control of the diabetes Although there are available numerous agents that are considered specific for moniliasis, these invariably fail to control the infection if the diabetic condition is poorly regulated The application of gentian violet is associated with the danger of a secondary dermatitis medicamentosa since sensitivity to this agent is very common Almost equally good results can be obtained by meticulous hygiene and the local application of salts of propionic acid or Mycostatin

Allergic vulvitis or lesions secondary to drug reactions usually complicate the picture in chronic vulvar lesions Sensitivity to nylon and other synthetic fabrics is common, and may cause extensive ulceration of the vulva *In such cases spontaneous healing occurs* when cotton underclothing is substituted for nylon Before any vulvar lesion can be accurately appraised, all possibly sensitizing contacts must be eliminated and all medication discontinued long enough to allow the primary disease to reach a baseline condition

Diagnosis of Chronic Vulvar Lesions

It is often difficult or impossible to make a specific diagnosis of vulvar lesions, even with the assistance of extensive clinical and laboratory examinations, including pathologic study of the tissue The following *simple classification of the benign vulvar lesions*, however offers a helpful approach to the problem It should be emphasized that biopsy of the vulva is indicated in the differential diagnosis of vulvar lesions in general, and that biopsy should be done on *every* ulcerative lesion in order to confirm or rule out *carcinomatous change*

Benign Vulvar Lesions

1 Simple atrophy
2 Chronic hypertrophic vulvitis
3 Leukoplakia
4 Kraurosis
5 *Lichen sclerosus et atrophicus*
6 Involutional anal stricture

Simple atrophy of the vulva is a physiologic condition, and does not produce *symptoms except in those instances* where an attempt

RELAXATION, PROLAPSE, RECTOCELE, CYSTOCELE, AND ENTEROCELE

These pathologic conditions are sequelae of lacerations and relaxation of the muscular and fibrous supports of the pelvic viscera. Although these conditions may progress gradually after the menopause as involutional changes produce a loss of strength and tone, it is not unusual for an acute condition to develop more or less suddenly. Involutional changes are responsible for the appearance of these lesions in nulliparas and in parous women 20 to 30 years after delivery. It is significant that these lesions often occur in women who have reduced their physical activities to a minimum with the result that retrogressive changes occur in the fibrous tissues and musculature of the entire body.

DIAGNOSIS. The symptoms produced by these lesions fall into three general categories.

1. The actual protrusion of pelvic tissues through the introitus is very unpleasant and uncomfortable, and few women will tolerate this anatomic abnormality unless they believe that nothing can be done to correct it.

2. The principal *subjective* symptoms are pelvic pressure and a sensation that all the organs are falling out. Back pain is usually related to primary disease of the spine or to postural changes rather than to the pelvic lesion. In patients with moderate degrees of relaxation and prolapse the subjective symptoms are completely relieved by lying down and are aggravated by standing for prolonged periods of time.

3. These conditions often affect the functions of the bladder and rectum. With complete prolapse or a large cystocele difficulty in voiding or urinary retention is more common than incontinence of urine. Many patients must lie down or reduce the cystocele manually in order to void. Incomplete emptying of the bladder may lead to urinary frequency and nocturia. When urinary incontinence is associated with moderate degrees of pelvic relaxation, a careful study of the urinary tract should be made to rule out intrinsic pathology there.

Although rectocele often contributes to difficulty in defecation, other possible causes for constipation must be considered before

instituted immediately These include the use of cotton undercloth ing, discontinuance of all medication, the avoidance of trauma to the vulva, the intermittent application of dry heat, and the use of olive or mineral oil on cotton, rather than soap and water, for cleansing the involved areas Patients should be urged to dry the vulvar area by patting it rather than rubbing it with a towel Mild sedation, particularly at night, should be employed during this period of treatment In a large number of patients this program will produce such dramatic improvement that specific therapy is unnecessary

The use of roentgen therapy for pruritus vulvae is absolutely contraindicated Although transient improvement may result, the permanent changes secondary to irradiation will lead to further progress of the lesion, and may ultimately make surgical treatment essential

Hormones, besides being expensive, rarely give good results in vulvar lesions Hydrocortisone ointment (1 per cent) can be ap plied for a short time, and may help to control secondary reactions The use of estrogens parenterally or locally rarely produces signifi cant effect, and should not be continued over long periods

Every effort should be made to control the symptoms of leuko plakia of the vulva without resort to surgery, for the incidence of recurrence following vulvectomy is exceedingly high Mering (1956) reports satisfactory results from his operation, which em- ploys subcutaneous dissection of the involved areas, but experience with this procedure elsewhere is too limited to allow an accurate appraisal of its value

Good results are obtained from the use of simple vulvectomy for kraurosis vulvae This lesion is sharply delineated, and there is great probability of success The operation is not mutilating, and when properly performed does not destroy normal sexual function

Involutional stricture of the anus responds very satisfactorily to dilatation under anesthesia For this reason, it is wise to determine the adequacy of the anus whenever any operative procedure is undertaken on an elderly patient Dilatation can also be satisfac torily performed by the patient, employing Young's rectal dilators or other simple aids In some cases remarkable relief from consti- pation may be obtained by either method of dilatation

if necessary Complete or nearly complete excision of the vagina assures uniformly good results With rare exceptions, abdominal procedures have no place in the treatment of prolapse and relaxation

Few patients in gynecologic practice are more grateful than the woman who has been given relief by reconstruction of the vaginal passages after months or years of discomfort and limitation of physical activity

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it is indicted as the primary cause Only when the physician obtains a history that the patient has to give manual support to the rectal wall in order to empty the bowel can he be certain of the relation constipation

of relaxation and prolapse is usually obvious on pelvic examination, examination of the patient in the lithotomy position with the bladder and bowel empty may be misleading In this position, the patient must strain down firmly to demonstrate lesions that are readily apparent when she is examined in the standing position, with one foot on a stool or chair

The exact differentiation of cystocele, rectocele, and enterocele is of great importance to the gynecologist who will undertake to correct the problem surgically, but is less important to the general practitioner, who needs to decide only whether or not referral or treatment is indicated

TREATMENT Pessaries of various types have a limited place in the treatment of relaxation and prolapse, although much symptomatic relief can be provided by the continuous use of a properly fitting pessary Doughnut and ring type pessaries are the ones most frequently employed The advent of plastic materials has decreased the amount of tissue reaction resulting from the use of pessaries but they still produce annoying and malodorous discharges that require unusual hygiene As a rule simple cleansing douches two or three times a week will suffice Pessaries must be removed and the vaginal walls inspected for evidence of infection or ulceration at intervals not exceeding four to six weeks Unless the patient is a very poor surgical risk, there is little excuse for subjecting her to the nuisance of wearing a pessary for the remainder of her life

Advances in the vaginal approach to these lesions improvements in anesthetic techniques (including wider use of local anesthetics), and the advent of antibiotic and chemotherapeutic drugs for the control of infections have made corrective surgical procedures safe for women of advanced age, even those with little cardiovascular or metabolic reserve Fortunately ambulation within a period of 24 hours does not jeopardize the success of operation

Vaginal hysterectomy with anatomic reconstruction of the anterior and posterior vaginal walls is the treatment of choice for these conditions The surgeon must ascertain whether or not the patient has an active sexual life, so that he can preserve the vaginal canal

data would indicate that there is no specific relationship between endocrine failure and the aging process and that endocrine deficiencies in the aged represent disturbances of specific organs Such deficiencies must be treated by replacement therapy in the same manner as deficiencies occurring at earlier ages except when complications of age necessitate altering the therapeutic approach (Starr 1957)

Although the hormones may stimulate development in youth, there is no evidence that their administration retards the tendency to senescence The hope of earlier workers that a knowledge of the endocrine function and the availability of hormones would furnish the "fountain of perpetual youth has not materialized Although the endocrine organs age as do the other organs and tissues there is no evidence that a particular tendency for these to deteriorate is associated with the aging process Hence such measures as giving small doses of thyroid to the aged because the basal metabolic rate is subnormal have no rational or practical basis Those who advocate raising the level of endocrine function without stimulating the end organs are oblivious of a basic principle of endocrinology namely that the administration of a hormone depresses the function of the normal tissue elaborating this hormone and hence induces no physiologic effect (Grollman 1947)

Because of the altered conditions attending senescence, the recognition and treatment of endocrine disturbances like those of other organ systems require special consideration in the aged individual It is these alterations of aging that will receive special consideration here For the sake of convenience each tissue will be considered separately Since diabetes and disturbances of reproductive function are considered elsewhere these will be discussed only briefly in this chapter

PITUITARY GLAND

The hypophysis decreases in size with age This involution involves primarily the anterior lobe or adenohypophysis and is reflected in a decreased production of the gonadotrophic and thyrotrophic hormones and presumably also of the other trophic hormones elaborated by the gland This loss of function is probably not primary but reflects the diminished need for these various

CHAPTER 20

Disorders of the Endocrine System

ARTHUR GROLLMAN

In the search for some specific disturbance as the primary cause of the aging process, deterioration of the endocrine organs has often been held responsible for the changes observed in senility. The early history of endocrinology is replete with claims of the rejuvenating effects of replacement therapy for postulated endocrine deficiencies. Particular attention was given to the gonads, since failure of these organs is related chronologically to the aging process. The earliest attempts at rejuvenation by Brown-Séquard and later by Steinach and Voronoff are well known.

The availability of adequate replacement therapy has shown the error of these earlier views, and the need for differentiating between the secondary effects of primary endocrine deficiency and the similar but unrelated changes that occur in tissues as a result of the aging process (Grollman, 1947, Thewlis, 1912). Now that we have available exact procedures for evaluating the degree of endocrine deficiency and potent agents capable of replacing the hormonal requirements of the tissues, one need no longer indulge in the wild speculation that characterized the work of earlier years in endocrinology. By applying rigid scientific criteria, one can determine exactly what role the aging process plays in inducing the changes observed in the endocrine organs, as well as the effects of these changes on the organism as a whole (Grollman, 1947).

Like other tissues, the endocrine organs gradually undergo retrogressive changes in old age. To what extent are such changes incidental to a diminished requirement for the hormones on the part of other tissues, and to what extent are they primary, a result of senescence of the endocrine organ itself? The presently available

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hormones that is consequent upon the reduced activity of the aging target organs.

Hypophyseal insufficiency is most commonly observed in Sheehan's syndrome, which appears usually *post partum*, and hence is of little geriatric significance. Instances of pituitary insufficiency observed in the aged are usually secondary to destruction of the gland by metastases. Diabetes insipidus results occasionally from metastases of carcinoma of the mammary glands. This condition as well as insufficiency of the anterior lobe, should receive the same treatment in aging patients that it does in younger individuals. Tumors of the hypophysis, which are rare, also present no special problems in the aged as compared to the younger group. Craniopharyngioma, an important intracranial lesion affecting pituitary and hypothalamic function, is congenital in origin, and makes its appearance earlier in life—usually in youth or middle age (Grollman, 1947).

PINEAL GLAND

The function of the pineal gland is unknown, and it is generally considered to be a vestigial organ that has no functional significance in the human being. Involutionary changes in the gland appear during childhood, the epithelial cells being replaced by acervulus (brain sand) and corpora arenacea. The retention of what appears to be functional tissue, however, may sometimes be observed in aged individuals (Grollman, 1947). Tumors of the pineal gland occur in children, and need not be discussed further here.

THYROID GLAND

The possible role of the thyroid in the genesis of some of the manifestations of senescence has been a subject of speculation, since many of the features of this state, such as dryness of the skin, reduced motor function, intolerance to cold, dystrophy of the hair and other ectodermal tissues, are also characteristic of hypothyroidism. On the basis of this similarity, the administration of thyroid has been recommended for aging patients. In a critical review of the subject, however, Carlson (1952) could find no convincing evidence that thyroid secretion decreases with advancing

age More recent studies on rats indicate that there is indeed a reduced rate of secretion per unit of body weight in senescent as compared to young animals, although the concentration of circulating protein bound iodine is not significantly different in the two age groups (Wilansky, *et al*, 1957) The available evidence indicates that this diminished rate of thyroid secretion does not reflect the existence of hypothyroidism, but represents either a homeostatic adaptation to the increased responsiveness of the target tissues, or a result of impaired inactivation or excretion of thyroid hormone (Starr, 1957)

Rice (1938) has studied the anatomy of the thyroid from birth to 80 years of age, and has found that it decreases in weight from about 30 Gm in the young adult to about 20 Gm at the age of 80 Histologically too, the thyroid of elderly people is altered in appearance, resembling that of the infant, its small, round *follicles* are lined by cuboidal epithelium The incidence of thyroid *nodules* increases with old age, a reflection of the periodic stimulus *to* overactivity to which the gland is subjected

After puberty, the basal metabolic rate decreases at an average *rate of 3 to 5* per cent per decade The protein bound iodine, however, manifests a normal spread that is independent of age, and there is no reason to believe that the thyroid becomes deficient with *the aging* process (Wilansky, *et al*, 1957) The *decrease in basal metabolic* rate reflects the gradual decrease in metabolic *activity characteristic* of aging tissues generally (Starr 1957)

As might be anticipated, the *symptoms observed in* elderly patients with thyroid disease differ *from those seen* in younger individuals These differences in the older age group result from two factors (1) the greater incidence of adenoma of the thyroid, as compared to *Graves s disease*, as a cause of hyperthyroidism in the aged and (2) reduction in *the capacity* of the tissues to respond to the *effects of hyperthyroidism* As a result, for example, of the decrease in cardiac reserve, *myocardial* insufficiency is often an early symptom *of hyperthyroidism* in the aged individual In the elderly patient with *hyperthyroidism*, the superimposed effects and *requirements of hypermetabolism* precipitate cardiac insufficiency manifested by *frank* congestive heart failure Arrhythmias, particularly *auricular fibrillation* are *common* in patients of the older age groups who harbor a solitary thyroid adenoma When the

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this basis, therapy with gonadal hormones has been advocated and is frequently used A survey of the available data, however, shows that this relationship between osteoporosis and gonadal insufficiency has not been proved, nor are the details of therapy established with any degree of certainty There remains a distinct possibility that so-called postmenopausal osteoporosis is merely a form of senile osteoporosis that happens to coincide with the menopause The marked variation from patient to patient in the response to hormonal therapy and the frequent failure of patients to respond to this form of therapy suggest that improved nutrition and increased stress on the bones may be responsible for such beneficial effects as have been attributed to treatment with the androgens (Whedon, 1956)

The 11-17 hydroxysteroids, when injected or produced in excess endogenously (as in Cushing's disease), also give rise to osteoporosis For this reason it has been suggested that a relative overproduction of these hormones as compared to the other hormones of the adrenal may be responsible for senile osteoporosis—but there is nothing to substantiate this theory The relative immobility of the aging patient the tendency to poor nutrition, and a decreasing application of stress to the skeleton may combine with the inadequate formation of osteoid tissue resulting from the involutional changes of age to give rise to so called postmenopausal osteoporosis Some patients show improvement in their calcium balance merely with the addition of calcium salts to the diet, whereas others, despite a strong positive nitrogen balance and without any hormone therapy show only a slightly positive calcium balance There is thus a marked discrepancy between the nitrogen and the calcium balances during treatment

As has been pointed out by Whedon (1956), who has critically examined the available data, there is some question regarding the effectiveness of the smaller doses of hormones, and of oral therapy He recommends the use of a high protein diet, including 1 5 Gm of calcium daily with an equivalent amount of phosphate, 10,000 to 50 000 units of vitamin D 1 7 Gm of strontium triphosphate, and at least 25 mg of testosterone propionate and 3,000 to 10,000 rat units of injectable estrogen daily in order to promote mineral storage

effects of hyperthyroidism are superimposed on the arteriosclerotic changes of the aged individual, the results include changes in the cerebral activity, easy fatigability, and manifestations of failure of other organ systems.

As one would expect, thyroid nodules are more often malignant in aged individuals than in the younger group, although such malignant growths of the thyroid are not uncommon in youth. In a group of 135 patients ranging in age from 4 to 46 years, only 4 had metastases with evidence of cancer in the thyroid, whereas 32 out of 147 patients in the group 47 to 82 years of age manifested this finding (Sloan, 1954).

PARATHYROID GLANDS AND CALCIUM METABOLISM

Disorders of parathyroid glands are less rare than was formerly believed to be the case, and are being encountered with increasing frequency. Disturbances in the function of these organs, either in hyperparathyroidism (a result usually of adenoma, rarely of carcinoma) or in hypoparathyroidism, give rise to long periods of morbidity and symptoms that may be erroneously attributed to other causes. In addition to its well-known effects on the skeletal and renal excretory systems, *hyper*parathyroidism may be associated with chronic dysfunction and ulceration of the gastrointestinal tract, chronic pancreatitis, anemia, or mental disturbances; while *hypo*parathyroidism may give rise to disturbances of the neuromuscular system and psychiatric manifestations mistaken usually for psychoneurosis. The occurrence of these disturbances in parathyroid function should always be kept in mind, for their recognition and correction will prevent a long period of debility and the ultimate development of irreversible and potentially fatal changes. The diagnosis and treatment of parathyroid disorders are the same in the aged as in younger patients.

The integrity of the skeletal system is maintained not only by the normal activity of the parathyroid glands but also by the manifold activities concerned in the regulation of normal calcium and phosphate metabolism. One of the striking disorders observed in the aging female is osteoporosis, a condition that has been attributed to gonadal deficiency resulting from the aging process. On

this basis, therapy with gonadal hormones has been advocated and is frequently used A survey of the available data, however, shows that this relationship between osteoporosis and gonadal insufficiency has not been proved, nor are the details of therapy established with any degree of certainty There remains a distinct possibility that so-called postmenopausal osteoporosis is merely a form of senile osteoporosis that happens to coincide with the menopause The marked variation from patient to patient in the response to hormonal therapy, and the frequent failure of patients to respond to this form of therapy suggest that improved nutrition and increased stress on the bones may be responsible for such beneficial effects as have been attributed to treatment with the androgens (Whedon, 1956)

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ISLETS OF THE PANCREAS

Diabetes, the most common of all endocrine disturbances, is discussed in Chapter 21 Its increasing incidence in the aged is to be expected, in view of the increased tendency to vascular and other degenerative diseases of the pancreas with age, and the resultant deficiency in the production of insulin (Bauer, 1956) As Jessop (1956) has shown, the reduced carbohydrate tolerance in persons past 50 is the result of age

ADRENAL GLAND

Disorders of the adrenal gland present no special characteristics in the aged that differ from those in younger individuals The excretion of neutral nonketonic steroids, which originate in the adrenal, diminishes significantly with age, as it does from chronic stress (Engle and Pincus, 1956) This finding has suggested the existence of an adrenopause comparable to the menopause of the gonads, but little evidence exists to support such an assumption The level of the 17-hydroxycorticosteroids of the blood, which is a better reflection of adrenal cortical function is not reduced materially with age

GONADS

Cessation of reproductive activity is one of the most striking effects of the aging process In the female, cessation of ovarian function is relatively abrupt, producing a definite menopause, although the ovary continues to secrete estrogen In the male on the other hand, the cessation of reproductive activity is more gradual, and may not be complete until a very advanced age (Thewlis, 1942) Since problems associated with the reproductive system are primarily of urologic and gynecologic interest, they are considered elsewhere in this volume There remain for consideration here only such general hormonal aspects of the subject as are not covered in other chapters

Alterations in activity of the gonads that occur with age are reflected by changes in the rate of excretion of the steroids and gonadotrophins in the urine Only some of these alterations in

steroid metabolism, however, are associated with changes in the reproductive system others are related to more general alterations in other organs and tissues The urinary excretion of the neutral reducing precursors of certain steroids and of the estrogens changes slightly or not at all with increasing age Other hormones are produced at a diminishing rate with increasing age Some, such as the neutral ketosteroid precursors in both sexes and the estrogens in women decline markedly, others, at a less precipitous rate

The pituitary reflects the alterations in gonadal function With the cessation of ovarian function the urinary gonadotrophin increases reaching its peak about 15 to 19 years after the menopause, then it falls progressively until the end of life In men the production of this hormone also increases slightly with age, but not to the extent seen in the female

Reproductive Activity in the Male

In contrast to the atrophy of the ovary and secondary sex organs in the female the testis undergoes a more gradual retrogression, and spermatogenesis may persist until late in life The pattern of hormonal excretion and testicular histology in aging has been studied by Segal Nelson and Flocks (1957), who determined the urinary excretion of gonadotrophins, estrogens, and 17 ketosteroids in more than 100 men ranging in age from 17 to 96 years The patterns of hormonal excretion were correlated not only with the chronologic age but also with the morphologic appearance of the testes These authors demonstrated that age per se cannot be used as a primary criterion for establishing normal values Individuals, even of the oldest age groups whose testes did not manifest the changes of the aging process continued to have hormone excretion levels within the normal range for young reproductive adults

The average value of the 17 ketosteroid excretion gradually declined from 8 0 mg per gram of urinary creatinine for men 20 to 30 years of age to an average of 4 0 mg per gram of creatinine for those 80 to 90 years of age Even among the octogenarians, however, some individuals had values approaching the 8 mg range The age group averages for urinary estrogens and gonadotrophins also fit no particular pattern With advancing age, the gonadotrophins tended to deviate from the normal of 4 to 24 mouse units

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In contrast to the atrophy of the ovary and secondary sex organs in the female, the *testis* undergoes a more gradual retrogression, and *spermatogenesis* may persist until late in life The pattern of hormonal excretion and testicular histology in aging has been studied by Segal, Nelson, and Flocks (1957), who determined the urinary excretion of gonadotrophins, estrogens, and 17 ketosteroids in more than 100 men ranging in age from 17 to 96 years The patterns of hormonal excretion were correlated not only with the chronologic age but also with the morphologic appearance of the testes These authors demonstrated that age per se cannot be used as a primary criterion for establishing normal values Individuals, even of the oldest age groups whose testes did not manifest the changes of the aging process continued to have hormo[illegible] retion le[illegible]

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to a range in excess of 48 mouse units; but even among the oldest patients the excretion of urinary gonadotrophins was within normal limits in more than half the cases. In all age groups there was a correlation between the histologic appearance of the testes and the urinary hormone patterns (Segal, *et al.*, 1957).

It must be concluded that the testicular activity, as determined both histologically and by the hormonal excretion pattern, varies widely from one person to another, and is not related simply to chronologic age.

Therapeutic Use of Sex Hormones

During senescence the endocrine glands share with practically all other organs and tissues anatomic changes characterized by hypoplasia, dehydration, and fibrosis, and a metabolic disturbance characterized by loss of protein from the tissues (Thewlis, 1942) A question of importance concerns the possible value of administering hormones—such as androgen, which has a protein anabolic effect— in an effort to overcome some of the deleterious effects of the aging process. The administration of estrogens in the climacteric, as described elsewhere in this volume, is well established and useful in those patients with symptoms characteristic of the so-called menopausal syndrome On the other hand, the use of either the male or the female sex hormone to treat indefinite symptoms of simple aging is to be deprecated The use of estrogens in the female and of androgens in the male is accompanied by the potential danger of stimulating neoplasia Prostatic carcinoma, which is common in a benign form in men over 50, may be activated by androgen therapy Attempts have been made to synthesize compounds without the androgenic effect that will still have potent anabolic effects, but the value of these compounds in the treatment of aging has not been established

The anabolic effect of certain androgens, as manifested by their capacity to increase the retention of nitrogen (without an increase in the blood nitrogen levels) and of sodium, potassium, phosphorus, and sulfur in the proportions present in protein, seems to offer a means of restoring the tissues normally lost in the aging process There is some question as to what extent this reversal of certain phases of tissue catabolism is desirable, and whether or not the

claims for improved vigor and well being in individuals so treated reflect the efficacy of the therapy or the result of suggestion and attention The same questions may be raised concerning the use of hormonal combinations

The use of the sex hormones as therapeutic measures in extra genital conditions has also attracted considerable attention The estrogens have been used on the skin in attempts to overcome the normal atrophy observed with age The use of androgens has been recommended for senile dermatoses and ano-genital pruritus in men Better established is the use of estrogens to overcome the in volutionary changes of the genital tract in women after the meno-pause In senile vaginitis or vulvovaginitis pruritus vulvae or anal and perineal pruritus the administration of estrogen by causing regeneration of the atrophic epithelium and diminution of leuko cytic infiltration may have an ameliorative effect (Grollman 1947)

The sex hormones have also been used to overcome certain effects of aging in the cardiovascular system The use of these agents to prevent the transitory vasodilatation of the skin resulting from vasomotor instability in the hot flashes of the menopausal syndrome is well established Their use in such peripheral vascular diseases as angina pectoris and hypertension however has been discarded as without value In fact the undesirable effects of these agents on blood pressure and sodium retention would serve as a contraindica tion to their use

The use of the sex hormones in a variety of other conditions en countered in the older patient is to be discouraged In mental and emotional disturbances for example they are generally useless except in the presence of vasomotor instability during the meno pause On the basis that the administration of hormones overcomes genital atrophy they have been given for such urologic symptoms as frequency urgency dysuria and incontinence They have been tried for diabetes precipitated or aggravated by the menopause and for hyperthyroidism Their value in all these conditions is doubtful (Grollman 1947)

Certain precautions and contraindications must be observed in the use of the sex hormones The use of estrogens will often pre

...ogens in women may produce masculinization with

hypertrophy of the clitoris, hirsutism, acne, and deepening of the voice, side effects that are too undesirable to warrant the use of these hormones in conditions where their efficacy is doubtful In the male the use of testosterone and other androgens may stimulate prostatic carcinoma. In both sexes the male hormone may overstimulate the libido. Because of their property of increasing electrolyte and water retention, the use of sex hormones is hazardous in cardiac patients with a tendency to congestive failure.

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CHAPTER 21

Metabolic Diseases

ERNEST YOUNT

DIABETES MELLITUS

Diabetes mellitus has become one of our most important geriatric problems The onset of the disease occurs characteristically in middle life occasionally in the seventies and rarely in the eighties Because of the increasing longevity of diabetic patients however—the result of improvements in therapy and in the management of complications—the incidence of diabetes is highest in the geriatric age group Prior to the discovery of insulin the life expectancy of patients with diabetes was 5 years prior to antibiotic therapy it was 10 years now it is approximately 20 years

DIAGNOSIS More than 1 per cent of the population in this country are known diabetics and probably an equal number of individuals have undiagnosed diabetes In elderly patients particularly it is easy to overlook the disease since the dramatic symptoms of thirst weight loss and polyuria may be missing Other clinical clues that may lead to the diagnosis of diabetes mellitus in older patients include weakness increasing fatigability *pruritus vulvae* cataracts and vascular disease of the lower extremities Any elderly patient with a chronic ulcer on the leg or foot should be carefully examined for diabetes

Routine urine examinations will disclose frank diabetes but may miss borderline cases Conversely certain medications frequently taken by elderly patients including salicylates and chloral hydrate may cause false positive reactions when the urine is tested for glycosuria

In attempting to establish a diagnosis of diabetes one must be

hypertrophy of the clitoris, hirsutism, acne, and deepening of the voice, side effects that are too undesirable to warrant the use of these hormones in conditions where their efficacy is doubtful. In the male the use of testosterone and other androgens may stimulate prostatic carcinoma In both sexes the male hormone may over stimulate the libido Because of their property of increasing electrolyte and water retention, the use of sex hormones is hazardous in cardiac patients with a tendency to congestive failure

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this reason the daily diet should include at least 0 5 Gm of protein per pound of ideal body weight The remainder of the calories may be distributed by allowing 40 to 50 per cent for carbohydrates and 50 to 60 per cent for fats Any further reduction in the carbohydrate intake might lead to ketosis Vitamins should be provided and the patient should be encouraged to drink milk in order to prevent decalcification The use of *Meal Planning with Exchange Lists** is strongly recommended

TABLE 21 1 CALCULATION OF A DIABETIC DIET

Ideal weight 150 lbs

0

200 calories

Carbohydrate
1200 × 40% = 480 calories
480 4 (calories/Gm) = 120 Gm of carbohydrate
Fat
1200 × 60% = 0 calories
20 9 (calories/Gm) 80 Gm of fat

After 10 to 20 days on such a diet the patient s nutritional and diabetic status should be progressing satisfactorily If the glycosuria has been corrected it is probable that insulin will not be required however it is well to remember that many elderly diabetic patients have a high renal threshold for sugar The Clinitest method for testing the urine is both simple and accurate and [illegible]

[illegible] is to be used the diet may be calculated in the same manner shown in Table 21 1 except that the calories remaining after the protein requirement has been provided should be equally divided between carbohydrates and fat Provision should be made for a bedtime snack to prevent nocturnal insulin reactions

The serious effects of insulin reactions upon the cardiovascular system of geriatric patients should be emphasized Cerebral vascular accidents may result from hypoglycemic shock and angina pectoris may become more severe In patients with known angina pectoris insulin therapy should be employed with extreme caution

* Published by the American Diabetic Association Inc 1 East 45th Street New York 17 N Y

familiar with the method employed by the laboratory to determine *the blood sugar level* Certain laboratories utilize the determination of nonfermentable reducing substances, which have a normal range of 80–120 mg per 100 cc of blood, while others employ true methods (Nelson-Somogyi), in which the normal range is 60 to 80 mg of glucose per 100 cc

A fasting blood *specimen is* less likely to indicate the presence of mild diabetes than a specimen obtained one to two hours after *eating If a single* blood sugar determination gives equivocal results, a glucose tolerance test should be performed after the patient has been on a diet adequate in carbohydrates for at least two days Most practitioners are familiar with the oral test, in which the significant determinations are those on the fasting specimen and on the sample obtained three hours after the ingestion of glucose In the absence of diabetes, the blood sugar level should be normal two to three hours after the stimulating dose of carbohydrate has been given

TREATMENT *The aims of diabetic management* are to provide comfort, maintain normal nutrition, and prevent complications of the disease Whether one attempts to control the disease rigidly or loosely is dependent upon his concept concerning the relationship of diabetic complications to glycosuria and hyperglycemia The following suggestions for managment represent a middle-of-the road compromise that should adequately fulfill the aims of treatment

In many elderly diabetics, particularly if they are obese, dietary regulation alone may adequately control the disease Asymptomatic patients who are not overweight, who are maintaining good nutrition, and whose postprandial blood sugars do not exceed 180 mg per 100 cc may be managed with no alteration of the diet except the substitution of fruit for the usual desserts

The majority of patients, however, will need the discipline of a diet that may be easily calculated (Table 21-1) Ten calories per pound of body weight provide the basal caloric requirements, and the total caloric intake is based on the *ideal* weight * For obese patients, a 25 per cent reduction in calories may be necessary to bring the weight within normal limits An adequate protein intake is extremely important for the maintenance of good health, and for

* Ideal body weights for patients of different heights and builds are shown in Table 21 2 on page 440

2 Avoid injuries
3 Wear well fitting shoes
4 Cut the toenails straight across with scissors
5 Report fungus infections promptly to your doctor
6 Seek medical help for the management of calluses and corns

Despite the occlusive nature of vascular impairment, the use of vasodilating agents (nicotinic acid, Ilidar, Priscoline, Arlidin) may be extremely helpful Caution is necessary if thiamine chloride is being prescribed simultaneously, since this may potentiate the effect of the vasodilating drugs and produce hypotensive reactions Mild activity is recommended and the patient is given instructions regarding Buerger's exercises In carefully selected cases sympathectomy may relieve pain especially the pain of claudication

In the presence of inflammation with exudation it is best to determine the causative organisms and their sensitivities to specific antibiotics If these laboratory procedures are not feasible, a broad spectrum antibiotic ointment may be used Elevation of the leg and the application of saline compresses may be most beneficial

If gangrene or an extensive infection especially one associated with osteomyelitis develops and does not respond to conservative therapy surgery may become necessary Amputation of a toe may be sufficient for circumscribed lesions For more extensive involvement the transmetatarsal approach has often been employed in recent years to obviate higher amputations If a higher approach is necessary consideration should be given to amputation below the knee Patients who have had this operation are able to adapt to a prosthesis more successfully than patients whose legs have been amputated at the thigh

The neurologic complications of diabetes are most troublesome in geriatric patients and are often attributed erroneously to disturbances in the circulation The differential diagnosis can usually be made by a careful history and physical examination The onset of neurologic difficulties is usually gradual and associated with weight loss and poor control of the diabetes The symptoms, described variously as burning numbness tingling and shoot[illegible]

[illegible] the patient is given intramuscu

and *gradual* control should be the goal Some elderly diabetics feel better with postprandial blood sugars closer to 180 than 120 mg per 100 cc In such patients no strenuous effort should be made to keep the blood sugar strictly within normal limits

In the overwhelming majority of diabetics requiring insulin the disease can be controlled with one injection of NPH or Lente insulin daily Ten units of either is usually sufficient for an initial dose, and the amount can be increased by 5 units every 4 days until the desired control is achieved The patient should be informed that the insulin requirement may be increased by concurrent illness and decreased by the ingestion of aspirin

Practical points that should be called to the patient's attention are the use of small caliber (No 26 or 27) needles of stainless steel, and such aids as alcohol receptacles to save the trouble of boiling syringes and needles Magnifying glasses may be attached to the syringes to aid those patients with poor visual acuity If the patient's eyesight is extremely impaired and he lives alone, 4 or 5 syringes may be filled by relatives or friends and kept in the refrigerator until needed

The sulfonylureas have been employed in this country since 1955 for the management of diabetes It appears that mild diabetes mellitus that has its onset in adult life may be adequately controlled by these oral preparations, with little risk of toxic reactions Wide clinical adoption of these agents, however, should await further studies

COMPLICATIONS Although diabetes in the elderly patient produces only mild symptoms and is easy to control, the disease may cause extensive damage Approximately 50 per cent of the geriatric diabetic patients have arteriosclerotic heart disease, 50 per cent have occlusive peripheral vascular disease, 50 per cent, hypertension, and 25 per cent, retinitis Renal disease is also common but more difficult to assess

Because of the disabling complications associated with circulatory disturbances in the legs and feet, the patient should be carefully instructed regarding foot care, as follows

1 Wash the feet with warm water and soap daily Dry them without rubbing (giving special attention to the skin between the toes), and massage them with cacao butter

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lar injections of vitamin B_{12}, 30 μg daily for one week and weekly thereafter More severe neurologic changes may produce nocturnal diarrhea, obstipation, impotence, bladder disturbances, and syncope

In view of the serious nature of the associated vascular complications, it is fortunate that diabetic coma is an unusual occurrence in geriatric practice The treatment is the same as in the younger patient

OBESITY

The belief of both doctors and laymen that obesity is deleterious to health is well supported by life insurance statistics For persons who are 5 to 14 per cent overweight the mortality rate is 22 per cent above normal, for those 15 to 24 per cent overweight, 44 per cent above normal, and for those 25 per cent or more overweight, 74 per cent Obesity is a hazard to the aged as well as the young In the age group from 57 to 62 years, the actual death rate, expressed as a percentage of the expected death rate, is 112 per cent for those 20 to 40 pounds overweight, and 130 per cent for those 50 to 80 pounds overweight

Obesity not only predisposes to the development of certain diseases but also increases their severity, the likelihood of complications, and the seriousness of symptoms Obese persons are particularly vulnerable to the cardiovascular-renal diseases such as coronary thrombosis, cerebral hemorrhage heart failure, and renal insufficiency Other diseases adversely influenced by obesity include diabetes mellitus, hypertension, cirrhosis, degenerative arthritis pulmonary emphysema, and gallbladder disease Surgical procedures ordinarily tolerated well by the geriatric patient become hazardous if gross obesity exists

In spite of arguments to the contrary, a person who is becoming obese is eating more calories than he needs for the maintenance of energy and for the growth and repair of tissues As a corollary if he consumes fewer calories than he needs for these processes, weight loss must occur It has been demonstrated in the experimental animal that food drive is under the influence of the hypothalamus, and that stimulation of this area results in increased food intake, while its destruction causes rejection of food There is no scientific basis, however, for assuming that any aberration of food

absorption, transport, or metabolism is responsible for obesity in human beings Endocrine disturbances are vastly overrated as a cause of obesity in the geriatric patient Thyroid deficiency is a relatively unimportant etiologic factor, and Cushing's disease, being characterized by the peculiar excess of fat deposition in the face, cervical hump, and abdomen, should not be confused with simple exogenous obesity

Limitation of caloric intake is the only way to correct obesity Whether reduction should be drastic or gradual depends upon the severity of symptoms and the patient's attitude Some patients receive great encouragement if they can note quick results, while others become depressed and irritable if drastic dietary measures are instituted It should be borne in mind that an elderly, inactive person may not lose weight on a 1,000 calorie diet, and that a diet containing only 600 to 800 calories may be necessary Such a diet should be high in protein since there is suggestive evidence that the appetite is determined largely by the protein content of the diet and that less hunger is experienced if the intake of this constituent is adequate Any diet provided should allow at least one egg one glass of skim milk, one portion of fruit, and one portion of lean meat *every day* A vitamin supplement is necessary to insure an adequate *intake*, and there is no necessity for restricting salt or water It is not unusual to find that obese patients eat a small breakfast and lunch, but a large dinner A reduction diet is often enhanced by a more normal distribution of food

Once the ideal weight has been established, the patient should be allowed to eat anything he desires after the basic requirements are met, provided he maintains his weight at the ideal level (Table 21 2) *As a rule* fats, concentrated carbohydrates, and mealy vegetables will have to be used sparingly

As the patient begins to lose weight, his co operation is usually encouraged by gratifying relief from symptoms such as breathlessness eructations and distention, headaches and dizziness, insomnia, joint pains (especially *in the weight* bearing joints), and intertriginous lesions Fears that weight reduction, by removing fat support from varicose veins or hernial sacs, would prove detrimental have been shown to be *unfounded* and *constipation*, often a troublesome feature of reduction diets for elderly patients, can be corrected by the use of bulk laxatives

TABLE 21-2 IDEAL WEIGHTS*

Men: Height (with shoes on) 1-inch heels, Feet	Inches	Men: Weight (pounds) ordinarily dressed, Small frame	Medium frame	Large frame	Women: Height (with shoes on) 2-inch heels, Feet	Inches	Women: Weight (pounds) ordinarily dressed, Small frame	Medium frame	Large frame
5	2	116-125	124-133	131-142	4	11	104-111	110-118	117-127
5	3	119-128	127-136	133-144	5	0	105-113	112-120	119-129
5	4	122-132	130-140	137-149	5	1	107-115	114-122	121-131
5	5	126-136	134-144	141-153	5	2	110-118	117-125	124-135
5	6	129-139	137-147	145-157	5	3	113-121	120-128	127-138
5	7	133-143	141-151	149-162	5	4	116-125	124-132	131-142
5	8	136-147	145-156	153-166	5	5	119-128	127-135	133-145
5	9	140-151	149-160	157-170	5	6	123-132	130-140	138-150
5	10	144-155	153-164	161-175	5	7	126-136	134-144	142-154
5	11	148-159	157-168	165-180	5	8	129-139	137-147	145-158
6	0	152-164	161-173	169-185	5	9	133-143	141-151	149-162
6	1	157-169	166-178	174-190	5	10	136-147	145-155	152-166
6	2	163-175	171-184	179-196	5	11	139-150	148-158	155-169
6	3	168-180	176-189	184-202					

* These figures are based on numerous medicoactuarial studies of hundreds of thousands of insured men and women, and are reproduced by courtesy of the Metropolitan Life Insurance Company from its pamphlet, "How to Control Your Weight," published in 1958

The use of appetite depressing drugs and thyroid substance in conjunction with a reducing diet has proved no more satisfactory than diet alone, and their use suggests to the patient that he can lose weight by methods other than a reduction in his food intake

Certain patients whose motivation is not strong enough or whose mental adjustment is inadequate are made worse by a reducing program In such cases the attempt at dieting should be discontinued The vast majority of patients will do well, provided their cases are individualized and the physician is willing to provide the necessary encouragement and reassurance, and to discuss thoroughly underlying conflicts besetting the compulsive eater

GOUT

Gout is a hereditary constitutional disease occurring predominantly in males Although the pre eminent clinical features, arthritis, tophi, renal involvement, and cardiovascular manifestations, generally appear in middle life, the metabolic derangement has

usually existed for years prior to this time Since the life span of gouty patients is shortened by only 5 years, the disease is important in geriatric practice and is frequently seen by physicians who maintain a constant awareness of the clinical picture

DIAGNOSIS The pathologic manifestations of gout are dependent upon the deposition of sodium urate in body tissues, with resultant inflammatory and degenerative changes There is a tendency for urates to be deposited in avascular areas such as the cartilaginous structures of the joints, ears, and nose, with little subsequent inflammatory reaction When deposits occur in soft tissues, severe inflammation usually develops Deposition of urate in the joints is responsible for the most common clinical manifestation of the disease, and 50 per cent of gouty patients at one time or another will present themselves with involvement of the great toe Other joints affected in order of frequency, are the feet, ankles, hands, and wrists The knees, hips shoulders, and elbows are less commonly involved and it is unusual to observe deposits in the articulations of the spine and jaw

Urate deposits frequently occur in the kidney and provoke inflammatory changes described as gouty or interstitial nephritis A history of renal calculi is obtained in 10 to 20 per cent of the cases, and it is of interest that gouty patients have a higher than normal incidence of opaque calcium stones as well as of nonopaque uric acid stones Vascular sclerosis is often noted in gouty patients, and generalized vascular disease, with extensive involvement of the coronary and cerebral arteries and degenerative changes in the aorta is fairly common

Hyperuricemia is found in more than 90 per cent of untreated gouty patients. Whether this condition is due to overproduction or decreased destruction of urates remains a debatable issue, however, there is little evidence to suggest that a decreased renal excretion of urates is a major factor The upper limit of normal for serum uric acid is 6 5 mg per 100 cc in males and 5 5 mg in females If the patients have received uricosuric agents such as salicylates or probenecid the levels of uric acid in the serum will be decreased, and the test may prove misleading

In the first or subclinical phase of the disease seldom encountered in geriatric practice, the sole finding is an elevated blood uric acid The acute arthritic phase characteristically develops abruptly

in a patient who has had no previous signs of joint disease, and the pain may be mild to excruciating In 1882 a physician named Morris Longstreth wrote, "Screw up the vise as tightly as possible and you have rheumatism Give it another turn, and that is gout" The acute episodes are usually monarticular, and may be associated with fever, leukocytosis, and elevation of the sedimentation rate Without treatment the episode usually subsides within a few days, often leaving no residual manifestations whatsoever

These acute episodes often follow trauma, surgery, or alcoholic indiscretion Certain therapeutic measures commonly used for elderly patients have also been considered as provocative agents These include liver extract, mercurial diuretics, testosterone propionate, and thiamine chloride The exact pathogenesis of the acute episode is poorly understood, but does not seem to be related to either hyperuricemia or urate deposition per se

In contrast to the acute phase, the chronic stage of gout is attributable to urate deposits in the tissues of the joints This stage is commonly observed in geriatric practice, and is described as chronic gouty arthritis As a rule, tophaceous deposits and deformities are present Acute episodes are often polyarticular, and there is a tendency to incomplete recovery Persistent albuminuria casts, and uremia may indicate the existence of gouty nephritis In this chronic phase, if the tophaceous deposits are not a prominent feature, the disease may be confused with traumatic arthritis, cellulitis, or bursitis

TREATMENT The treatment of gouty arthritis varies with the nature of the attack and the stage of the disease Acute episodes can often be prevented or aborted Colchicine has been used in the treatment of gout for 1 400 years and is extremely effective when given orally in doses of 0 6 mg every hour until nausea, vomiting or diarrhea develops After the acute episode has subsided, 0 6 mg of colchicine may be given twice a day for one week If oral therapy cannot be tolerated, the intravenous administration of 2 mg of colchicine in 20 cc of normal saline is usually effective, and can be repeated once in 6 hours if necessary

Phenylbutazone (Butazolidin) may terminate an acute attack within 24 hours An effective oral dosage schedule consists of an initial dose of 400 mg, followed in 4 hours by 100 mg every hour

for 4 doses This method of administration produces few side effects or toxic symptoms

Less desirable in elderly patients, but suitable for refractory cases, is the intramuscular injection of 100 mg of aqueous corticotropin, followed by smaller doses (60 to 80 mg) daily for 4 days Cortisone and related steroid preparations are not too effective

The efficacy of the above drugs in the management of gout obviates the necessity of administering such a potentially hazardous agent as cinchophen

Chronic gouty arthritis may be adequately treated by the administration of uricosuric agents such as probenecid (Benemid), 0 5 Gm one to four times daily This drug inhibits the tubular reabsorption of urates, and consequently reduces urate deposits in the *tissues* These tophaceous deposits may decrease in size or disappear entirely Acute episodes of joint pain may disappear or become less frequent, although an acute flare up of gout immediately following the institution of probenecid therapy is not unusual This may be prevented by the simultaneous administration of colchicine, *0 5 mg* twice a day for an indefinite period In the presence of sever[illegible] age [illegible] tha[illegible] of probenecid, since the two agents are antagonistic, it is *not* desirable to use them simultaneously

Patients who have a tendency to form uric acid stones will be *benefited* by the administration of 8 Gm of sodium citrate daily

Since it *has been shown* that urates can be synthesized from carbohydrates, fats and purine free proteins as well as from purines there has been little enthusiasm for rigid dietary measures in the *treatment of* gout The important considerations are a well balanced *diet and*, because gout frequently leads to circulatory complications, the rigid prevention or control of obesity If purine restriction is desired, this may be easily accomplished by the avoidance of sweetbreads anchovies, sardines, liver, kidney, and brains

Elderly gouty patients should be encouraged to have their male offspring obtain *a uric acid determination* The detection of hyperuricemia at an early age and subsequent treatment with a uricosuric agent may prevent the development of manifestations of gout in the joints and blood vessels

Lazy Tom with jacket blue
Stole his father's gouty shoe
The worst of harm that Dan can wish him
Is that his gouty shoe may fit him

HYPOGLYCEMIA

Spontaneous hypoglycemia, a condition in which the depression of the blood sugar is sufficient to produce symptoms referable to the autonomic and central nervous systems, presents no special characteristics in the aged While this condition may result from adrenal insufficiency, pituitary hypofunction, severe congestive heart failure, diffuse liver disease, or islet cell tumors of the pancreas, it occurs most often without demonstrable cause The primary diagnostic problem lies in differentiating between hypoglycemia that is a manifestation of hyperinsulinism resulting from an islet cell tumor and "functional" hypoglycemia, in which no definite pathologic factor can be demonstrated

The episodes of hypoglycemia may last from minutes to hours The symptoms differ from patient to patient, and vary in severity in the same patient The vegetative disturbances include tachycardia, pallor, sweating, nausea, hunger, and syncope Central nervous manifestations may consist of ocular palsies, spasticity, muscle weakness, and convulsive seizures Mental aberrations are not unusual

Islet cell adenomas of the pancreas have been reported in patients in their eighties as well as in infants Islet cell carcinomas are fortunately much less common, though I have seen one such case in a 79 year-old woman Attacks resulting from islet cell tumors, whether benign or malignant, usually occur during the fasting state, and the onset of seizures or coma during the early morning hours is common In some cases fasting must be continued for 48 hours to provoke an attack A blood sugar obtained during or immediately following the episode will be less than 50 mg per 100 cc The attack should be relieved promptly by the administration of food or intravenous glucose In the presence of this diagnostic triad—that is, attacks (1) precipitated by fasting, (2) associated with a blood sugar of less than 50 mg per 100 cc, and (3) im-

mediately responding to carbohydrate administration—surgical exploration is justified

The symptoms of functional hypoglycemia are less severe than those resulting from insulin producing pancreatic tumors Attacks do not occur during prolonged fasting, but are apt to develop just before meals A glucose tolerance test, which is of no value in diagnosing true hyperinsulinism, may be normal, flat, or diabetic in character during the first 2 hours but shows a characteristic drop below 50 mg per 100 cc 3 to 5 hours after the administration of glucose Treatment consists in prescribing a high protein, low carbohydrate diet to avoid the stimulating effect of carbohydrates The patient should be instructed to carry an emergency ration with him to ward off impending episodes of hypoglycemia

Functional hypoglycemia is often associated with psychoneurotic symptoms Whether it is a cause or an effect is a debatable question but at least psychotherapy is often helpful, in addition to dietary measures

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not cause disability until fairly well established, and the need for separating degenerative states from acute illness or neoplastic change Laboratory and radiologic studies may often make it possible to recognize and treat basic illness instead of offering only confused symptomatic treatment of vague complaints

HEMATOLOGIC FINDINGS IN GERIATRIC PATIENTS

In order to determine the significance of hematologic findings in older individuals a series of patients beyond the age of 60 years have been studied with the following questions in mind (1) How frequently are abnormal hematologic findings encountered? (2) What are the most common causes of the abnormalities?

The records of all patients 60 years old or more who were admitted to the North Carolina Baptist Hospital from January 1, 1956, through June 30 1957 were collected for a survey of the hematologic data All charts with one or more abnormal hematologic *determinations* were isolated for more intensive study Of the total of 2749 records examined, only 639 (23 2 per cent) displayed hematologic findings outside the following 'normal limits'

Hemoglobin 11 5 to 17 Gm per 100 cc *
Red blood cells
White blood cells
Prothrombin time

Because the number of records showing the erythrocyte count and prothrombin time was too small to be statistically significant, only the 621 cases with abnormal hemoglobin levels or leukocyte counts were included in the final evaluation of results (Table 22 1)
At least one
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The abnormality most commonly found was a decreased hemoglobin in 402 of the 621 patients the level was below 11 5 Gm per 100 cc Only 28 *patients* (4 5 per cent) had hemoglobin values above 17 Gm Fifty nine patients (9 5 per cent) had both anemia and abnormal numbers of *leukocytes*

From this study it would appear that three fourths of hospitalized patients over 60 years of age have normal hemoglobins and

* In this hospital 15 4 Gm = 100 per cent.

CHAPTER 22

Contributions of Hematology to Diagnosis and Treatment in Geriatrics

LUCILE W. HUTAFF

In an appraisal of the physical status of the older patient, the medical history loses some of its value The past experience of an individual 60 years old is broad and varied Work, childbearing, infectious diseases, obesity, and dietary patterns, in addition to the stress of emotional, financial, and social vicissitudes, have left their mark The patient's memory constitutes the only means of recapturing these experiences, and frequently all that are recalled are the illnesses that have impressed themselves because of pain or severe inconvenience, or have resulted in loss of earning power The physical state of the elderly patient, furthermore, is frequently too precarious to permit the reconstruction of an orderly picture of the illness that brings him to the physician, and members of the family are often unable to supply information helpful in determining the rate of decline from health or the duration of the illness All too often the early signs and symptoms of a serious disorder have been dismissed by the patient or his relatives as "just old age"

For these reasons, the physical examination assumes greater significance in elderly patients, and the physician needs all his skill in inspection, palpation, percussion, and auscultation, as well as patience and persistence, to obtain the needed information By the same token, well-chosen laboratory procedures are of greater import in geriatric practice, especially when one is aware of the common degenerative diseases, the fact that certain disorders may

not cause disability until fairly well established and the need for separating degenerative states from acute illness or neoplastic change Laboratory and radiologic studies may often make it possible to recognize and treat basic illness instead of offering only confused symptomatic treatment of vague complaints

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Hemoglobin 11 5 to 17 Gm per 100 cc *
Red blood cells 3 800 000 to 5 800 000 per cubic millimeter
White blood cells 4 000 to 15 000 per cubic millimeter
Prothrombin time Greater than 13 8 seconds

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From this study it would appear that three fourths of hospitalized patients over 60 years of age have normal hemoglobins and

* In this hospital 15 4 Gm = 100 per cent.

leukocyte counts. By carrying out further studies in the remaining 25 per cent of the patients it should be possible in many cases to differentiate between temporary or physiologic conditions responsible for the deviation and more serious disorders in which definitive therapy might be applied. While it is true that many patients with

TABLE 22-1. HEMATOLOGIC FINDINGS IN 621 PATIENTS OVER 60 YEARS OF AGE WITH ABNORMALITIES OF THE HEMOGLOBIN OR LEUKOCYTE COUNT

	Number	*Per cent*	*Number*	*Per cent*
Decreased hemoglobin			402	64.7
Alone	235	37.9		
With decreased RBC*	108	17.3		
With decreased WBC	10	1.6		
With increased WBC	49	7.9		
Increased hemoglobin			28	4.5
Increased WBC alone			176	28.4
Decreased WBC alone			15	2.4

* In approximately one third of the patients with hemoglobin levels below 11.5 Gm erythrocyte counts were available also.

'normal' hemograms have the same diseases as those with abnormal hematologic determinations, it is also true that unexplained anemia or persistently depressed leukocyte values may sometimes be the only indication that a disorder is present, or the only clue to the cause underlying a patient's failure to respond to treatment.

NONHEMATOLOGIC DISEASES ASSOCIATED WITH ABNORMAL HEMATOLOGIC FINDINGS (Table 22-2)

Cardiovascular Disease

Anemia occurring in patients with heart disease is most often attributable to renal disease or to a chronic infection such as subacute bacterial endocarditis. In our series only 3 of the 31 anemic patients with cardiovascular disease had subacute bacterial endocarditis, although 27 patients with cardiovascular disease had azotemia* in addition to abnormal hematologic findings (Table 22-3).

* We accept the definition of azotemia given by Callen and Limarzi (1950) as a nonprotein nitrogen level above 40 mg per 100 cc of blood or a urea nitrogen level above 25 mg per 100 cc.

Since the two most common causes of anemia in heart disease accounted for only 30 of the 58 cases, it seems likely that additional efforts to find the cause of the anemia would have been rewarding

Case 1 A 70 year old housewife was admitted for repair of a urethral prolapse There was a past history of dysuria and renal lithiasis of 10 years duration The positive findings on physical examination included a blood pressure of 160 systolic, 90 diastolic, tenderness on palpation in the left upper quadrant and left costovertebral angle and a 1 cm prolapse of the urethral mucosa The blood count was as follows hemoglobin 11 1 Gm, white blood cells 6,200, with a normal differential count The urinalysis showed a specific gravity of 1 010 no albumin or sugar, and 6 to 8 white blood cells per high power field

COMMENT The history of recurrent renal stones and dysuria, together with the findings of anemia and a low specific gravity of the urine, indicates a need for determining the functional status of the kidneys A blood urea nitrogen determination would have been of value Although the patient was classed as having a cardiovascular disease, the anemia seems more likely to have been of renal origin

Case 2 An 86-year old woman was admitted for the treatment of congestive failure There was a past history of hypertension and of gradual cardiac decompensation during a period of weeks Examination revealed obvious signs of congestive failure dyspnea, enlargement of the heart, rales at both lung bases, and moderate to marked pitting edema of the legs The blood count showed 11 2 Gm of hemoglobin, 4 100,000 red blood cells and 14 000 white blood cells The blood urea nitrogen was 15 mg per 100 cc

The patient was treated with diuretics, digitalis and a salt poor diet, she showed marked improvement and lost 11 pounds in the next eight days

COMMENT Further studies should have been done to ascertain the nature of the anemia

The occurrence of thrombosis in patients with abnormally high hemoglobin levels should always suggest the possibility of polycythemia

Case 3 A retired white man, 73 years old was admitted one day following a stroke He was known to have had hypertension for 10 years

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TABLE 22-2 TYPES OF DISORDERS ENCOUNTERED IN GERIATRIC PATIENTS WITH HEMATOLOGIC ABERRATIONS

	Gm per 100 cc						
	Hgb <*11.5*	*Hgb* >*17*	*Hgb*↓ *WBC*↓	*Hgb*↓ *WBC*↑	*WBC*↑ *only*	*WBC*↓ *only*	*Total*
Cardiovascular							
Myocardial infarction	3	1			12		16
Congestive failure	7				7	1	15
Heart disease, no failure	7					2	9
Misc. heart disease	4				4		8
Arteriosclerosis, generalized	5				1		6
Cerebrovascular accident	2	2			7		11
Thrombosis, thrombophlebitis	3	1			5		9
Total	31	4			36	3	74
Pulmonary							
Emphysema and fibrosis		5			6		11
Asthma					2		2
Infection	7			1	11	2	21
Carcinoma	4				7		11
Total	11	5		1	26	2	45
Gastrointestinal							
Carcinoma, tongue and esophagus	2						2
Esophageal varices	4						4
Hiatus hernia	7			1			8
Peptic ulcer	27	1		4	1		33
Gastric carcinoma	6			2			8
Hepatic disease	2			1	1		4
Hepatic carcinoma	1						1
Acute pancreatitis					2		2
Pancreatic pseudocyst					1		1
Pancreatic carcinoma	1						1
Cholecystitis and cholelithiasis				2	5	1	8
Small intestine, benign lesions	3			1			4
Ileus	2	2			7		11
Large intestinal infection	1			3	13		17
Colon, benign lesions	4			1			5
Colon, carcinoma	10		1	2			13
Rectum, benign lesions	8					1	9
Rectum, carcinoma	4						4
Bleeding, site undetermined	7			5	1		13
Total	89	3	1	22	31	2	148

TABLE 22-2 TYPES OF DISORDERS ENCOUNTERED IN GERIATRIC PATIENTS WITH HEMATOLOGIC ABERRATIONS (*Continued*)

	Gm per 100 cc						
	Hgb <11.5	*Hgb >17*	*Hgb↓ WBC↓*	*Hgb↓ WBC↑*	*WBC↑ only*	*WBC↓ only*	*Total*
Urologic							
Infection	2				6	1	9
Stone ureteral and renal	3			1	6		10
Bladder, dysfunction	3						3
Bladder carcinoma	7						7
Prostate benign enlargement	5				6		11
Prostate carcinoma	13		2	2	6		23
Kidney carcinoma	3			1			4
Ureter, carcinoma	1						1
Total	37		2	4	24	1	68
Gynecologic							
Miscellaneous benign lesions	3						3
Cervix carcinoma	1			1	1		3
Ovary carcinoma	3						3
Vulva carcinoma	1						1
Uterus carcinoma						1	1
Breast carcinoma	3						3
Total	11			1	1	1	14
Endocrine							
Diabetes mellitus	4				4		8
Myxedema	4						4
Goiter nontoxic		1					1
Hyperparathyroidism	1						1
Total	9	1			4		14
Skeletal							
Fractures multiple	4	1		3	2		10
Fractures single	12	1			13		26
Fracture and osteoporosis	4						4
Osteoporosis	6						6
Miscellaneous	4						4
Total	30	2		3	15		50
Malignancy other sites							
Basal cell carcinoma	2						2
Mesothelioma	1						1
Squamous cell carcinoma	1	1		2	1		5
Brain tumor	2				1		3
Reticulum cell sarcoma	2						2
Generalized, primary site unknown	5			1			6
Total	13	1		3	2		19

TABLE 22 2 TYPES OF DISORDERS ENCOUNTERED IN GERIATRIC PATIENTS WITH HEMATOLOGIC ABERRATIONS

	Gm per 100 cc						
	Hgb <11 5	*Hgb >17*	*Hgb↓ WBC↓*	*Hgb↓ WBC↑*	*WBC↑ only*	*WBC↓ only*	*Total*
Cardiovascular							
Myocardial infarction	3	1			12		16
Congestive failure	7				7	1	15
Heart disease no failure	7					2	9
Misc heart disease	4				4		8
Arteriosclerosis generalized	5				1		6
Cerebrovascular accident	2	2			7		11
Thrombosis thrombophlebitis	3	1			5		9
Total	31	4			36	3	74
Pulmonary							
Emphysema and fibrosis		5			6		11
Asthma					2		2
Infection	7			1	11	2	21
Carcinoma	4				7		11
Total	11	5		1	26	2	45
Gastrointestinal							
Carcinoma tongue and esophagus	2						2
Esophageal varices	4						4
Hiatus hernia	7			1			8
Peptic ulcer	27	1		4	1		33
Gastric carcinoma	6			2			8
Hepatic disease	2			1	1		4
Hepatic carcinoma	1						1
Acute pancreatitis					2		2
Pancreatic pseudocyst					1		1
Pancreatic carcinoma	1						1
Cholecystitis and cholelithiasis				2	5	1	8
Small intestine benign lesions	3			1			4
Ileus	2	2			7		11
Large intestinal infection	1			3	13		17
Colon benign lesions	4			1			5
Colon carcinoma	10		1	2			13
Rectum benign lesions	8					1	9
Rectum carcinoma	4						4
Bleeding site undetermined	7			5	1		13
Total	89	3	1	22	31	2	148

TABLE 22 2 TYPES OF DISORDERS ENCOUNTERED IN GERIATRIC PATIENTS WITH HEMATOLOGIC ABERRATIONS (*Continued*)

	Gm per 100 cc.						
	Hgb <11 5	Hgb. >17	Hgb↓ WBC↓	Hgb↓ WBC↑	WBC↑ only	WBC↓ only	Total
Urologic							
Infection	2				6	1	9
Stone, ureteral and renal	3			1	6		10
Bladder, dysfunction	3						3
Bladder, carcinoma	7						7
Prostate, benign enlargement	5				6		11
Prostate carcinoma	13		2	2	6		23
Kidney, carcinoma	3			1			4
Ureter, carcinoma	1						1
Total	37		2	4	24	1	68
Gynecologic							
Miscellaneous benign lesions	3						3
Cervix carcinoma	1			1	1		3
Ovary carcinoma	3						3
Vulva, carcinoma	1						1
Uterus, carcinoma						1	1
Breast carcinoma	3						3
Total	11			1	1	1	14
Endocrine							
Diabetes mellitus	4				4		8
Myxedema	4						4
Goiter, nontoxic		1					1
Hyperparathyroidism	1						1
Total	9	1			4		14
Skeletal							
Fractures multiple	4	1		3	2		10
Fractures single	12	1			13		26
Fracture and osteoporosis	4						4
Osteoporosis	6						6
Miscellaneous	4						4
Total	30	2		3	15		50
Malignancy other sites							
Basal cell carcinoma	2						2
Mesothelioma	1						1
Squamous cell carcinoma	1	1		2	1		5
Brain tumor	2				1		3
Reticulum cell sarcoma	2						2
Generalized primary site unknown	5			1			6
Total	13	1		3	2		19

TABLE 22-2 TYPES OF DISORDERS ENCOUNTERED IN GERIATRIC PATIENTS WITH HEMATOLOGIC ABERRATIONS (*Continued*)

	Gm per 100 cc						
	Hgb <11.5	*Hgb >17*	*Hgb↓ WBC↓*	*Hgb↓ WBC↑*	*WBC↑ only*	*WBC↓ only*	*Total*
Miscellaneous							
Burns					2		2
Gunshot wounds, no fracture					4		4
Dehydration		2					2
Elevated blood urea nitrogen	64	1	1	7	6		79
Postoperative bleeding	1				1		2
Psychiatric, neurologic	2	2			3	1	8
Dermatologic (nonmalignant)	3				1		4
Arthritis	5				1		6
Multiple abscesses	2				3		5
Cause not found	13	3			1		17
Total	90	8	1	7	22	1	129
Hematologic							
Leukemia, acute	1						1
Leukemia, chronic lymphatic	3	1		2	9	1	16
Leukemia, chronic granulocytic				2	2		4
Polycythemia vera		2			1		3
Lymphoma	3	1			2	1	7
Multiple myeloma	5		1		1	1	8
Pernicious anemia	5						5
Hemolytic anemia	1			1			2
Hereditary telangiectasia	1						1
Pancytopenia and myelofibrosis	2		4				6
Toxic reaction to medication			1			2	3
Unexplainable	4						4
Total	25	4	6	5	15	5	60

TABLE 22-3 CHIEF SYSTEM AFFECTED IN PATIENTS WITH ELEVATED BLOOD UREA NITROGEN AND ABNORMAL HEMATOLOGIC FINDINGS

	Blood urea nitrogen (mg in 100 cc)					
System	*23-29*	*30-39*	*40-49*	*50-99*	*100*	*Total*
Cardiovascular	9	7	4	4	3	27
Pulmonary	1	1	1		2	5
Gastrointestinal		1	2	5	1	9
Urologic	5	4	2	9	6	26
Endocrine	1			2	2	5
Skeletal	1	1	1			3
Malignancy, other sites					1	1
Total	17	14	10	20	15	76

Physical examination disclosed an elevated blood pressure (225 systolic, 125 diastolic) right hemiparesis dysarthria and cardiac enlargement Chest films showed tortuosity of the thoracic aorta and increased peri bronchial markings in the medial portions of both lobes Laboratory data were as follows Hemoglobin 17 2 Gm white blood cells 8 000 with 79 per cent neutrophils blood urea nitrogen 16 mg per 100 cc specific gravity of the urine 1 022 with no albuminuria or glycosuria The patient showed early signs of recovery, and after intensive physical therapy was discharged considerably improved on the eighteenth day Medication for hypertension produced a favorable decline in blood pressure which was recorded as 160 systolic, 80 diastolic, six weeks after discharge at this time the patient was walking with a crutch

COMMENT The combination of hypertension vascular occlusion increased pulmonary markings and elevated hemoglobin suggests the possibility of primary or secondary polycythemia Further laboratory studies (hemoglobin hematocrit, volume indexes reticulocyte count marrow study) would be helpful in planning for this patient s future care

The leukocyte count was elevated in 36 of the 74 patients with cardiovascular disease As would be expected this finding was accounted for by infection or tissue necrosis In 3 cases the leukocytes were found to be below 4 000 per cubic millimeter A hypotensive drug was suspected in 2 patients, the third case is described

Case 4 A 63 year old housewife was hospitalized elsewhere in 1955 because of congestive failure associated with thyrotoxicosis At this time she was given medication for "goiter" and she had continued to take this Two months before admission to the North Carolina Baptist Hospital she sustained a minor injury to her right leg it became swollen and bruised and the referring physician found that her "white blood cells were low" Physical examination showed a conspicuous nodular enlargement of the thyroid enlargement of the heart to the left and an encrusted lesion measuring 2 by 4 cm above the lateral malleolus on the right Pigmented areas were found on both lower extremities

A blood count showed 11 5 Gm of hemoglobin and 2 600 white blood cells with 22 per cent polymorphonuclears 53 per cent bands 4 per cent metamyelocytes 1 per cent eosinophils 18 per cent lymphocytes and 2 per cent monocytes the platelet count was 172 000 per cubic millimeter The protein bound iodine level was 9 3 μg per 100 cc and the radioactive iodine uptake was increased Study of aspirated bone

marrow revealed an increase in neutrophils, particularly the promyelocytes, with some reduction in platelet formation by the megakaryocytes

COMMENT. The patient was treated with radioactive iodine, and soon began to improve, the leukocyte level rose to 6,600, but the proportion of immature neutrophils remained elevated It was thought that the leukopenia might be the result of therapy with propylthiouracil, even though granulocytopenia was never present

Pulmonary Disease

Malignancy and infection accounted for anemia and leukocytosis in about two thirds of the 45 cases in this category Emphysema and pulmonary fibrosis were accompanied by an increase in the hemoglobin or leukocyte count, or both Leukopenia was noted in 2 patients with virus infections of the lung Pulmonary disease, however, is not infrequently associated with hematologic diseases, as is illustrated by the following case

Case 5 A 63 year-old lawyer was admitted because of cough of six weeks' duration and abnormalities in the roentgenogram of the chest On physical examination the blood pressure was found to be 180 systolic, 95 diastolic, the pharynx appeared reddened, and there were scattered wheezes over the lung bases bilaterally with impairment of resonance over the left base Radiographic examination of the chest showed slight enlargement of the left hilar shadow, and a general increase in density of the interstitial pattern Under positive pressure (Valsalva maneuver) there was radiographic evidence of diminution in the size of the left hilar shadow, a finding which suggested that the enlargement was of vascular origin The hemoglobin was 17 6 Gm, the hematocrit 53 volumes per cent, and the white blood cells 7,000 with 52 per cent neutrophils, 44 per cent lymphocytes and 4 per cent monocytes

COMMENT Appropriate treatment could be instituted if it were determined that this patient had primary or secondary polycythemia

Gastrointestinal Disease

Anemia is so commonly associated with gastrointestinal disease that the occurrence of hypochromic microcytic (iron deficiency)

anemia in the adult requires a detailed and exhaustive study of the entire intestinal tract to rule out the presence of benign or malignant lesions Such a search should begin with *repeated* examination of the feces for occult blood The search for benign lesions (hiatus hernia diverticulosis and polyps) is particularly important in older patients because of the increasing incidence of these lesions in the geriatric age group Many of these lesions can be removed surgically and others are amenable to rational measures for the control of symptoms Subsequent periodic examinations of patients with such benign gastrointestinal diseases should include radiologic or visual examination of the lesion particularly when the likelihood of malignant degeneration is great

Leukocytosis alone with gastrointestinal complaints usually indicates infection localized or generalized Persistent elevation of the leukocyte count is often associated with malignant disease of the liver or pancreas Intestinal ileus whether of functional (adynamic ileus) or mechanical etiology is another cause of leukocytosis

The following cases serve to illustrate the fact that a classical history of gastrointestinal disease is often absent in patients with organic lesions

Case 6 A 62-year-old woman was referred to the North Carolina Baptist Hospital because of anemia She had noted increasing fatigue and weakness for one month and had been having tarry stools for six weeks She had had no abdominal pain nausea or vomiting Positive physical findings included obesity and a blood pressure of 200 systolic 100 diastolic no masses or tenderness was noted Stool examinations were negative for occult blood but there was radiographic evidence of a small ulcer in the prepyloric region The hemoglobin was 10 5 Gm the red blood cells 3 800 000 the hematocrit 30 volumes per cent the mean corpuscular volume 83 cu μ the mean corpuscular hemoglobin content 36 per cent and the reticulocyte count 3 per cent

COMMENT This patient s history was misleading until marked signs of blood loss appeared

Case 7 A 79 year old retired feed dealer was admitted in October 1955 for transurethral resection of the prostate At that time the hemoglobin was 12 Gm the red blood cells 4 200 000 The patient recovered from the operation uneventfully but in February 1956 he returned complaining of abdominal pain At that time a history of diges

tive difficulty dating back to May, 1955, was obtained The first symptom was dull, aching epigastric pain, sometimes relieved by eating Following the urologic operation the abdominal pain became more severe While on a Florida vacation the patient suddenly lost consciousness and was admitted to a hospital Transfusions were given there before he was transferred to the North Carolina Baptist Hospital Physical examination on this second admission revealed slight abdominal tenderness, the hemoglobin was 11 Gm Radiographic examination of the stomach showed a large filling defect arising from the greater curvature Gastrectomy was performed, and microscopic examination confirmed the diagnosis of adenocarcinoma of the stomach

COMMENT Within the space of three months this advanced malignant lesion made its presence known in a dramatic fashion On the first admission no history of gastric distress was noted!

Urogenital Diseases

Blood loss resulting from excessive uterine bleeding is common In postmenopausal women, however, severe bleeding is seldom associated with benign lesions of the genital tract Since functional disorders are also infrequent in the postmenopausal period, malignant change should be suspected in every case of vaginal bleeding until it is disproved by the most precise measures

In the male, obstructive lesions of the urogenital tract are common, and bring about a series of biochemical changes which may result from temporary malfunction of the excretory system Diagnosis is frequently complicated by diseases in other systems (atherosclerosis and diabetes, for example), as well as those in the kidney itself Except for those cases of anemia related to azotemia, the most likely cause of anemia of urogenital origin in the male is carcinoma of the prostate

Case 8 A 76 year old retired farmer admitted in January, 1957 complained of "rheumatism of six weeks' duration in the left hip and back Shortly after its onset he noted swelling in the left groin Two weeks prior to admission biopsy of the left inguinal region at another hospital disclosed a malignant neoplasm On physical examination the liver was felt 3 cm below the right costal margin and the prostate was enlarged firm, and rubbery The hemoglobin was 11 2 Gm, the white blood cells 5,500, with a normal differential count The urea nitrogen was 16 mg

per 100 cc alkaline phosphatase 18.2 Bodansky units acid phosphatase 4.7 Shinowara units serum calcium 10.9 mg per 100 cc., serum phosphorus 3.1 mg per 100 cc Roentgenograms disclosed osteoblastic changes in the left acetabulum and left ileum Transurethral resection of the prostate was performed and the pathologic report confirmed the clinical diagnosis of adenocarcinoma of the prostate

COMMENT The somewhat abrupt onset of "rheumatism" is often the only symptom leading to the correct diagnosis of a neoplasm metastatic to bone

Endocrine Disturbances

Anemia associated with myxedema is the most common finding in endocrine disorders An example is described

Case 9 A 69 year-old woman with a long history of increasing weakness was admitted in April 1956 for diagnostic studies She had been walking with the aid of a cane for four years she was known to have been anemic for 2 to 5 years and had recently become "hoarse" Physical examination disclosed an obese woman who responded slowly to questions The skin of the face was puffy the hair was thin and the eyebrows were sparse There was moderate edema of the lower extremities and reflexes were hypoactive Blood studies were as follows hemoglobin 10.4 Gm red blood cells 2 800 000 hematocrit 32 volumes per cent, mean corpuscular volume 115 cu. μ, mean corpuscular hemoglobin content 33 per cent. white blood cells 6,700 with a normal differential count macrocytosis of the erythrocytes was present The blood cholesterol was 342 mg per 100 cc protein bound iodine 2.6 μg per 100 cc. Radioactive iodine uptake was 1 per cent in 24 hours.

Four weeks after thyroid therapy was started the hemoglobin was 11.3 Gm red blood cells 3,200 000 The mean corpuscular hemoglobin content was 103 cu μ

COMMENT On thyroid therapy alone the hemoglobin increased and the patient was much improved

Skeletal Disorders

The aging process particularly in women is associated with osteoporosis and suspectibility to fractures following minimal trauma Too often this state of affairs is blamed on age alone and

little effort is made to explain the occurrence of anemia in patients with fractures or with the radiographic picture of osteoporosis Myelomatosis is often associated with generalized rarefaction of bone rather than involvement of a single local area When either finding is coupled with anemia, further studies should be carried out As Albright and Reifenstein (1948) have pointed out, senile osteoporosis can usually be differentiated from osteomalacia by determinations of the serum calcium, phosphorus, protein, and alkaline phosphatase senile osteoporosis is characterized by a low or normal serum calcium, a normal or slightly elevated serum phosphorus, and normal levels of alkaline phosphatase In the cases presented below, bone disease other than senile osteoporosis should have been considered

Case 10 A 71 year-old man was admitted in February, 1956 for confirmation of the diagnosis of hyperparathyroidism Complaints of dull aching in the lumbosacral area had begun 6 years previously, for the past 6 months he had noted marked weakness and progressive loss of weight At another hospital the serum calcium was reported as 17 mg per 100 cc, the phosphorus as 3 mg per 100 cc Physical examination disclosed scoliosis of the dorsal spine to the left, the prostate was not enlarged A blood count showed 10 5 Gm of hemoglobin, 4 000 000 red blood cells, and 6,400 white blood cells, with 48 per cent polymorphonuclears, 44 per cent lymphocytes, 6 per cent monocytes, and 2 per cent basophils The blood urea nitrogen was 15 mg per 100 cc, the serum proteins 6 5 Gm (serum albumin 3 3 Gm, globulin 3 2 Gm) Laboratory studies on two occasions showed the serum calcium to be 11 and 10 9 mg per 100 cc, the phosphorus 3 7 and 2 9 mg per 100 cc, and the alkaline phosphatase 4 1 and 4 6 Bodansky units, acid phosphatase was 0 2 Shinowara units Radiologic examination disclosed demineralization of the bones of the thorax, lumbosacral spine, pelvis hands and skull, together with bilateral nephrolithiasis

The patient was discharged on androgen estrogen therapy, but did not improve He was not seen between July 1956, and September 1957, when he was readmitted after sustaining a fracture of the right femur and right humerus The only change on physical examination was swelling and tenderness of the right shoulder and pain on movement of the right leg The hemoglobin was 10 Gm, the blood urea nitrogen 17 mg per 100 cc, serum calcium 10 8 mg per 100 cc serum phosphorus 3 3 mg, alkaline phosphatase 13 4 Bodansky units Marked osteoporosis was again noted on the radiographic films The patient was

given transfusions and the fractures were treated in the usual fashion Improvement was noted and he was discharged on the twelfth day

COMMENT According to Bartter (1957), demineralization of the bones of the skull as well as other bones and elevation of the alkaline phosphatase point toward osteomalacia rather than osteoporosis In the case just described, the slow course of the disease and the duration of anemia are suggestive of myelomatosis Although few of the chemical analyses are compatible with this impression aspiration of bone marrow might have been diagnostic

Case 11 A 71 year old woman was admitted for investigation of the cause of a severe headache that had begun suddenly 12 days previously Nausea and vomiting accompanied the pain in the head, and the neck became stiff On physical examination there was some mental confusion some stiffness of the neck and a positive plantar response on the left An electroencephalogram and lumbar puncture confirmed the impression of subarachnoid hemorrhage into the left temporal lobe Radiographic examination revealed disseminated demineralization of the bones of the skull and thorax The blood count showed 11 Gm of hemoglobin a hematocrit of 34 volumes per cent and 6 000 white blood cells with 73 per cent polymorphonuclears 16 per cent lymphocytes 6 per cent eosinophils and 5 per cent monocytes The blood urea nitrogen was 20 mg. per 100 cc total serum proteins 7 4 Gm (serum albumin 2 9 Gm, serum globulin 4 5 Gm) serum alkaline phosphatase 4 1 Bodansky units

COMMENT Demineralization of the skull is not usually associated with senile osteoporosis this finding together with the mild anemia and elevated serum globulin suggests the possibility of myeloma

It is of interest to note that fractures particularly single fractures are frequently accompanied by an elevation in the leukocyte count It would be of further interest to know how long this elevation persists and whether immature forms of the leukocytes are present in the peripheral blood

Malignancies and Miscellaneous Conditions

The first category includes malignant neoplasms of sites other than those already discussed and cases of carcinomatosis The effect of chronic infection on the hemoglobin is noted in patients

with arthritis, dermatologic conditions, and multiple abscesses Cases in which the blood urea nitrogen was elevated are placed in this category, since it is sometimes difficult to locate the causes of this disturbance In 17 cases the data were insufficient to allow classification

Diseases of the Blood

The etiologic basis for hematologic aberrations in this study was attributed to disease of the hematopoietic system per se in only 9 7 per cent of the cases The inference is clear that all physicians should be aware of the hematologic implications of conditions that they commonly encounter for in the great majority of cases the etiology of anemia or leukocytosis will be found in systems other than the blood forming organs

Leukemia the lymphomas and multiple myeloma accounted for 36 of the 60 cases of blood dyscrasias encountered While therapy of myelomatosis is still unsatisfactory recent advances in the treatment of leukemia and the lymphomas offer hope for the maintenance of some of these patients in comfort and physical strength rather than in invalidism *

Special attention is directed to two hematologic conditions commonly found in the elderly patient the recognition and treatment of which may not only prolong life but may add immeasurably to physical comfort useful employment and meaningful participation in community and family life The first of these conditions polycythemia vera has already been discussed in a previous section (cardiovascular disease) The second disorder pernicious anemia is frequently missed because of the similarity of some of the signs and symptoms to degenerative states accompanying senescence

The diagnosis of pernicious anemia was made in five cases in this series but the sometimes brief record in other instances would suggest that at least eleven additional patients should have been studied for megaloblastic anemia The following cases illustrate the various symptoms which are common in this disease

Case 12 A 62 year old grocery store owner was admitted complaining of "jerking spells" across his chest and shoulders for a year without loss

* Excellent texts by Wintrobe (1956) and by Whitby and Britton (1953) discuss in detail the diagnosis and treatment of these diseases

of consciousness or loss of sphincter control Physical examination showed a thin apprehensive man in no distress The tongue was smooth at the edges there were no enlarged organs and reflexes were equal and active Laboratory urine not remarkable red blood cells 2 000 000 hemoglobin 7 8 Gm hematocrit 22 volumes per cent mean corpuscular volume 110 cu μ mean corpuscular hemoglobin content 35 per cent white blood cells 5 000 with 52 per cent granulocytes 1 per cent bands 40 per cent lymphocytes 3 per cent eosinophils, 3 per cent monocytes and 1 per cent basophils The blood platelets appeared adequate but there was anisocytosis and poikilocytosis of the erythrocytes Gastric analysis revealed achlorhydria after histamine stimulation Before further studies could be done the patient left the hospital against advice

Case 13 A 62-year-old realtor who was referred because of difficulty in swallowing He also complained of frequent attacks of indigestion increasing weakness for 2 years and chronic sinus pain On examination the patient was verbose but co operative The skin was not remarkable the liver was felt 2 cm below the right costal margin on deep inspiration Tendon reflexes were active and equal Laboratory data included a blood urea nitrogen of 13 mg per 100 cc a fasting blood sugar of 76 mg per 100 cc and normal urinary findings The hemoglobin was 13 9 Gm hematocrit 41 volumes per cent, mean corpuscular hemoglobin content 34 per cent, white blood cells 3 000 with an essentially normal differential A second leukocyte count was 4 600 There was radiologic evidence of left ventricular hypertrophy elongation of the aorta and clouding of the left maxillary sinus The patient was discharged with the diagnosis of possible esophageal diverticulum and psychoneurosis

COMMENT Bizarre psychic behavior is often characteristic of patients with pernicious anemia although usually there is ample evidence of [illegible]

[illegible] is frequently encountered in pernicious anemia Elevated mean corpuscular hemoglobin concentration and leukopenia should have indicated the possibility of megaloblastic changes

Case 14 This 66-year old housewife had been admitted to the North Carolina Baptist Hospital for the first time at the age of 54 when she was treated for cystitis The only abnormal laboratory finding at that time was pyuria. She was admitted again in October 1956 complaining of intermittent nausea and vomiting of undigested food She was known

to have had anemia for four months, and had been taking vitamin B_{12} and iron by mouth without effect. The positive physical findings were pallor, diminished hearing, and a coated tongue. Hematologic findings, including color indexes, were not remarkable; the serum albumin was 2.3 Gm. per 100 cc., and the total serum proteins were 4.5 Gm. per 100 cc. Radiographic studies of the upper gastrointestinal tract were not remarkable. Gastric analysis showed no free hydrochloric acid after histamine stimulation. The patient was given insulin and Amytal therapy; she improved, gained 10 pounds, and was discharged on a high protein, high vitamin diet.

The third admission occurred two months later because of the continuation of periodic nausea and vomiting, and pitting edema of the ankles. Except for the edema, physical examination was unchanged. At this time the hemoglobin was 10.4 Gm., red blood cells 4,900,000, white blood cells 7,000, and serum proteins 5.3 Gm. The patient was discharged after receiving two units of whole blood by transfusion.

She returned for the fourth admission in December, 1957, never having been completely free of periods of nausea and vomiting. Physical examination was again unchanged, but the hemoglobin was only 9.3 Gm., and the red blood cells 3,900,000; the white cell count was 7,200 with a normal differential count. In addition to an enriched diet, the patient was given daily injections of crude liver extract. On the thirteenth hospital day the reticulocyte count was 4 per cent and the hemoglobin had risen to 10.5 Gm.

COMMENT. The diagnosis of pernicious anemia was not entertained in this case, although there was apparent response to crude liver extract. If the diagnosis had been confirmed, instructions for continuous therapy would have been given, the therapeutic agent would have been changed to a more potent preparation, and future complications could have been avoided.

In most instances the diagnosis of pernicious anemia can be substantiated with blood and bone marrow studies and determination of the presence or absence of free hydrochloric acid in the gastric contents. In some cases the use of Schilling test (1953, 1955) will be of great value in determining the etiology of the anemia.

The final category of blood diseases is familiar to all hematologists: "unexplainable" cases of anemia, in which all efforts to find the cause meet with failure. In this situation the anemia must be treated while observation is continued in the hope that the picture will eventually become clear.

Case 15 A 70-year old widow was first seen on March 6 1957, complaining of weakness and loss of appetite for a year A known diabetic for 35 years the patient had been taking 15 units of protamine zinc insulin daily and maintaining a fairly strict diet She had no digestive disturbances but complained of pain in the left shoulder, and had noted some numbness and tingling of the extremities Anemia was known to have been present for six years and three transfusions had been given by her local physician three months prior to admission

On physical examination there was moderate pallor of the skin and the liver was felt 4 cm below the right costal margin the left shoulder was markedly limited in all motions of flexion extension and rotation Tendon reflexes were diminished while position sense was preserved The blood count was as follows hemoglobin 10 4 Gm, hematocrit 31 volumes per cent, mean corpuscular hemoglobin content 30 per cent white blood cells 3 600 with 65 per cent polymorphonuclears 3 per cent bands 1 per cent metamyelocytes 22 per cent lymphocytes, 2 per cent eosinophils 7 per cent monocytes and 0 9 per cent reticulocytes A blood smear showed macrocytosis and anisocytosis of the erythrocytes but no macropolycytes platelets appeared to be plentiful Gastric analysis revealed free hydrochloric acid without histamine stimulation One stool examination was reported as being positive for occult blood The sternal marrow appeared cellular and some elements of megaloblastosis were described Radiographic studies showed possible achalasia diffuse osteoporosis of bones in the spine and more marked osteoporosis in the region of the left shoulder A barium enema examination was unsatisfactory

The patient was given 40 µg of vitamin B_{12} daily by injection and after 5 days the reticulocyte count had risen to 4.2 per cent. She was then returned to her physician for continued care The anemia recurred, however and was not alleviated by the addition of small amounts of pteroylglutamic acid by mouth Repeated transfusions were required to keep the level of hemoglobin above 8 Gm and the patient returned for further study on July 20 1957 Examination was essentially the same as before except that the liver was not felt The hemoglobin was 9 7 Gm the hematocrit 30 volumes per cent the mean corpuscular hemoglobin content 31 per cent the white blood cells 7 000 The differential count was not remarkable but nucleated erythrocytes were noted on the smear and the reticulocyte count was 2 7 per cent The Coombs test was negative and two tests for osmotic fragility of the erythrocytes were normal The serum proteins at this time were 7 4 Gm per 100 cc serum albumin 3 8 Gm serum globulin 3 7 Gm the alkaline phosphatase was 6 2 Bodansky units serum calcium 9 4 mg per 100

to have had anemia for four months, and had been taking vitamin B_{12} and iron by mouth without effect The positive physical findings were pallor, diminished hearing, and a coated tongue Hematologic findings including color indexes, were not remarkable, the serum albumin was 2 3 Gm per 100 cc, and the total serum proteins were 4 5 Gm per 100 cc Radiographic studies of the upper gastrointestinal tract were not remarkable Gastric analysis showed no free hydrochloric acid after histamine stimulation The patient was given insulin and Amytal therapy, she improved, gained 10 pounds, and was discharged on a high protein, high vitamin diet

The third admission occurred two months later because of the continuation of *periodic nausea and vomiting, and pitting edema* of the ankles Except for the edema, physical examination was unchanged At *this time the hemoglobin was 10 4 Gm, red blood cells 4,900 000, white* blood cells 7,000, and serum proteins 5 3 Gm The patient was discharged *after receiving two units of whole blood by transfusion*

She returned for the fourth admission in December, 1957, never having been completely free of periods of nausea and vomiting *Physical examination* was again unchanged, but the hemoglobin was only 9 3 Gm, and the red blood cells 3,900,000, the white cell count was 7,200 with a normal differential count In addition to an enriched diet, the patient was given daily injections of crude liver extract On the thirteenth hospital day the reticulocyte count was 4 per cent and the hemoglobin had risen to 10 5 Gm

COMMENT The diagnosis of pernicious anemia was *not* entertained in this case, although there was apparent response to crude liver extract If the diagnosis had been confirmed, instructions for continuous therapy would have been given, the therapeutic agent would have been changed to a more potent preparation, and future complications could have been avoided

In most instances the diagnosis of pernicious anemia can be substantiated *with blood and bone marrow studies* and determination of the presence or absence of free hydrochloric acid in the gastric contents In some cases the use of *Schilling test (1953 1955)* will be of great value in determining the etiology of the anemia

The final category of blood diseases is familiar to *all* hematologists "unexplainable" cases of anemia, in which all efforts to find the cause meet with failure In this situation the anemia must be treated while observation is continued in the hope that the picture will eventually become clear

(Bartter, 1957) The psychiatric quirks expected in the elderly patient must not be confused with the mental changes associated with pernicious anemia The finding of bleeding hemorrhoids should not lead one to overlook an early carcinoma of the colon Since anemia is often related to renal disorders, determination of the blood urea nitrogen should be done in many cases

It is important to remember that unusually high values for the hemoglobin and erythrocytes are as significant in the elderly as those below the normal level, polycythemia is commonly recognized as a disease of the later years

The treatment of hematologic aberrations is intimately bound with the diagnosis, and when the cause is determined proper therapy becomes evident In iron deficiency anemia, elimination of the condition responsible for iron loss and some form of therapy with iron will usually bring gratifying results Many patients with polycythemia show marked improvement under therapy with radioactive phosphorus In megaloblastic anemia treatment with cyanocobalamin (vitamin B_{12}), if given before irreversible changes occur, results in a most favorable response

Less fortunate are those patients whose hematologic aberrations are due to malignant disease or renal disease, for the treatment for these conditions is not satisfactory As a rule, however, chronic leukemia in elderly patients is of a comparatively benign nature, judicious use of the newer chemotherapeutic drugs (chlorambucil, 6-mercaptopurine, busulfan) and the intravenous nitrogen mustards in conjunction with the corticosteroids, can help the patient to have a comfortable existence and reduce the periods of real illness for significant intervals

Even in myelomatosis for which therapy is as yet most unsatisfactory, a few patients can be given some relief by careful treatment with Urethane the corticosteroids, irradiation, or a combination of these measures

In many of the chronic conditions so often encountered in elderly patients repeated hematologic determinations will afford a measure of the patient's response to treatment, and will be profitable in evaluating the different types of therapy and the complications that may arise Not only does the elderly patient profit by such conscientious follow up but the physician gains a sense of confidence in handling the patient during his illness

cc and serum phosphorus 4 0 mg per 100 cc The serum lactodehydrogenase (LDH) was 97 units a value that was considered normal and not compatible with hemolysis A second examination of the bone marrow showed no essential change from the original specimen

At this point the patient requested that no further diagnostic studies be made It was decided to conduct a therapeutic trial of steroids under careful supervision and at the same time to give injections of a repository androgen estrogen preparation in an effort to improve the osteoporosis During this period of treatment additional insulin was necessary but no transfusions were given Three months later the patient returned stating that she felt much better and "more alive" The blood picture however was essentially unchanged hemoglobin 8 8 Gm white blood cells 3 300 reticulocytes 3 6 per cent Several examinations of the stools were negative for occult blood

COMMENT The cause of anemia in this case remains an enigma in spite of all reasonable attempts at diagnosis Difficulties in transportation have made it impossible to exclude hemolytic anemia by studying the survival time of the erythrocytes with radioactive chromium

DIAGNOSIS AND TREATMENT OF HEMATOLOGIC DISORDERS

The finding of abnormal hematologic values in elderly patients *indicates an unhealthy state and should not be considered* a part of normal senescence

When the hemoglobin is outside the expected limits the test should be repeated and additional data concerning the hematocrit and levels of erythrocytes and leukocytes should be obtained Careful study of the stained smear may confirm the blood indexes the presence or absence of macrocytes macropolycytes nucleated erythrocytes polychromatophilia and decreased platelets will serve to direct further studies Examination of the bone marrow is frequently of invaluable assistance

One must remain constantly aware that the older patient is subject to certain diseases in addition to the degenerative effects of age Osteoporosis must be distinguished from other bone disease rheumatism should not camouflage bony metastasis Determinations of the serum proteins calcium phosphorus alkaline and acid phosphatase should be ordered more frequently roentgen studies of the skull teeth and pelvis may *be of special significance*

CHAPTER 23

Diseases of the Nervous System in the Aged Patient

Arranged by Common Presenting Symptoms

MARTIN G NETSKY

INTRODUCTION

Neurologic diagnosis is at times more difficult in the person over 60 than in the younger adult The neurologic examination, especially the sensory portion, is not as easy to perform or to interpret Many findings are abnormal in younger persons but are frequently found in normal people past 60 These are discussed in detail in The Neurologic Examination, below Furthermore, the incidence of diseases of the nervous system varies considerably at different ages although few diseases occur exclusively within a limited age group

Most congenital malformations are apparent early in life, but craniopharyngiomas may first cause symptoms after 60 Multiple sclerosis progressive muscular dystrophy, Wilson's disease, poliomyelitis and petit mal seizures are examples of diseases usually occurring earlier in life, but occasionally having their onset after 60 By contrast, cerebrovascular accidents, progressive muscular atrophies paralysis agitans, and trigeminal neuralgia are more common in older people, although they may occur at any age Temporal arteritis is a rare disorder, and until now has been described only in older patients Brain tumors are found at all ages, and are frequent in the older population, but the incidence of specific types differs according to age

The older person often reacts differently to disease Infections

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TABLE 23-1 NEUROLOGIC LOSSES WITH AGE

	Percentage of normal individuals showing loss of listed functions*			
Age in decades	51–60	61–70	71–80	81–90
Sensation				
Vibration decreased at ankles	5	15	25	50
Vibration decreased at wrists	0	0	0	0
Motor functions				
General power poor	0	0	5	15
Rotation of forearm poor	0	0	15	35
Finger-to-nose test poor	0	10	20	30
Reflexes absent				
Ankle	20	37	70	90
Knee	0	10	15	60
Triceps	0	0	20	50
Biceps	0	0	15	30
Abdominal skin	0	33	40	60
Absence of normal plantar response	0	0	5	5
Cranial nerves				
Absent pupillary reaction to light	0	30	40	66
Absent pupillary reaction to convergence	0	30	40	80
Absent pupillary reaction to light and convergence	0	10	25	50

* Data compiled from Howell (1949) Smith (1956) and personal findings

sensory tests early in the examination before the patient tires, and to check the findings again at a later time Vibratory sensation may be lost at the toes ankles, and knees after 50, and is absent in approximately half the individuals over 80 Vibratory sense seldom disappears, however in the upper extremities Sense of position of the fingers and wrists is almost always maintained Light touch sensation is mildly impaired The ability to recognize double simultaneous touch stimuli diminishes with increasing age (Green and Bender 1953) In 25 per cent of 200 healthy old men studied by Howell (1949) pain or temperature sensation, or both, were impaired in the extremities. The inner aspects of the shins and forearms were the sites most often affected, and the sensory loss was in irregular patches, never in the entire distribution of roots or peripheral nerves

Motor Functions and Co-ordination

The older person moves slowly with small steps His facial expressions and spontaneous movements of his body are diminished

may cause little fever or leukocytosis, meningeal irritation may not produce the usual meningeal signs, papilledema is less frequent in old patients with brain tumors, painful disorders may be far less painful in old age, but despite this, pain is a common complaint, and the complications of herpes zoster may be more distressing than in the younger patient

The unreliability of the history when memory is affected or when other mental disturbances are present is another factor making diagnosis more difficult in old people Laboratory tests must be interpreted according to the age of the patient Achlorhydria is frequent, the electroencephalogram is often slow and resembles the childhood record, but occasionally a fast record is obtained, roentgenograms may show demineralization of the bones Finally, multiple disorders are frequently encountered

The disorders of the nervous system to be discussed in this chapter are arranged by common presenting signs and symptoms rather than by diseases An attempt is made to deal with principles of diagnosis and treatment rather than to offer minute details and rare possibilities Psychiatric symptoms such as irritability, memory disturbance, dementia, and depression are dealt with elsewhere, although they may be related to organic neurologic diseases

THE NEUROLOGIC EXAMINATION OF THE AGED PATIENT

The age of the patient must be considered in interpreting the neurologic examination Some findings indicative of organic disorder in persons under 60 may be found in older people without neurologic disease A knowledge of changes "normal" for the patient's age is therefore important to avoid incorrect diagnoses and unnecessary studies The differences from the younger adult become more frequent as age increases (Table 23 1) Despite this, examination of old people may on occasion reveal findings similar to those found in the younger person

Sensory Changes

The sensory examination is usually the most difficult, especially when communication with the patient is impaired by deafness, defects of speech, or mental disturbance It is best to perform the

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Absent pupillary reaction to light	0	30	40	66
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sensory tests early in the examination before the patient tires, and to check the findings again at a later time Vibratory sensation may be lost at the toes, ankles, and knees after 50, and is absent in approximately half the individuals over 80 Vibratory sense seldom disappears, however, in the upper extremities Sense of position of the fingers and wrists is almost always maintained Light touch sensation is mildly impaired The ability to recognize double simultaneous touch stimuli diminishes with increasing age (Green and Bender, 1953) In 25 per cent of 200 healthy old men studied by Howell (1949), pain or temperature sensation, or both, were impaired in the extremities The inner aspects of the shins and forearms were the sites most often affected, and the sensory loss was in irregular patches, never in the entire distribution of roots or peripheral nerves

Motor Functions and Co-ordination

The older person moves slowly with small steps His facial expressions and spontaneous movements of his body are diminished

He stands in a flexed position Normal associated movements, such as the swing of the arms in walking, are decreased Muscle power generally diminishes with age, but exceptions are encountered Old people tire easily, and their reaction time is increased The paucity and slowness of movement, the decrease in associated movements, and the flexed posture suggest Parkinsonism, but these signs are encountered in people who do not become tremulous and rigid These signs should be considered, therefore, as evidence of normal aging in some persons

Generalized mild wasting of muscles is common, especially in the hands In patients with arthritic disease, focal atrophy occurs around the involved joints Neurologic disease should be suspected when focal and asymmetric wasting is found in the absence of arthritis Fasciculations do not usually occur

Old people have increasing difficulty in rapidly rotating the forearms This probably is evidence of incoordination rather than muscular weakness Difficulty in the finger-to nose test is most often on the same basis Cerebellar disorders may be suspected when ataxia is present in a patient with normal muscular strength (see Ataxia, below)

Reflexes

With increasing age the deep (tendon) reflexes first become sluggish and then disappear completely The ankle jerks are first and most severely affected The loss begins at 50 years of age in some persons, and few people over 80 still have this reflex The knee jerk is present in most people in the sixties, but is obtained in less than half of those past 80 The arm reflexes (supinator, biceps, triceps) are normal in all healthy people under 70 but are present in only 50 per cent of individuals in the late eighties The reflex loss associated with normal aging is almost always symmetric Asymmetric loss of reflexes should be further investigated The decrease or loss of reflexes may be related to changes in sensory fibers, or to fibrosis of the tendons and muscles

Abdominal cutaneous reflexes are obtained less frequently as age advances They are present in most people in the fifties except when the abdominal wall is flabby, but then tend to disappear

Babinski's sign has been found in 5 per cent of people past 70 without obvious neurologic disease (Howell 1949)

Cranial Nerves

Ability to smell is decreased bilaterally Presbyopia is an inevitable consequence of aging The pupillary reactions to light and convergence are progressively altered with age and may be lost separately or together The aged pupil thus may simulate the Argyll Robertson pupil (a miotic pupil fixed to light but reacting in convergence) but is seldom as miotic as the Argyll Robertson pupil Half the individuals over 85 have completely inactive pupils which are usually small but may be dilated

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qu ... ual directions Old people do not normally have nystagmus with quick and slow components

Taste sensation is generally decreased Deafness is common resulting from deterioration of the eighth cranial nerve or of the nerve and cochlea The hearing impairment is greater for high pitched sounds than for low tones

Sphincteric Functions

Increased frequency of urination is common This is most often related to prostatic enlargement in men and is generally associated with muscular weakness rather than neurologic disorder Constipation in the aged patient may be related to decreased secretion of mucus or to inactive musculature in the colon The tone of the sphincters *is often* diminished but incontinence on this basis occurs only in women with cystoceles and stress incontinence

WEAKNESS AND PARALYSIS

General Considerations

Weakness is diminution of muscular strength Paralysis indicates the loss of ability *to* contract muscles voluntarily Paresis signifies

He stands in a flexed position. Normal associated movements, such as the swing of the arms in walking, are decreased. Muscle power generally diminishes with age, but exceptions are encountered. Old people tire easily, and their reaction time is increased. The paucity and slowness of movement, the decrease in associated movements, and the flexed posture suggest Parkinsonism, but these signs are encountered in people who do not become tremulous and rigid. These signs should be considered, therefore, as evidence of normal aging in some persons.

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The ability to converge the eyes is lost in old age and there may be impairment of upward gaze The range of ocular motion is frequently limited in all directions Old people do not normally have nystagmus with quick and slow components

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incomplete paralysis. Organic paralysis results from interruption of the motor pathways anywhere from the cerebral cortex to the muscle The suffix "plegia" originally meant stroke, but is now used to signify paralysis Hemiplegia means paresis or paralysis of the face, arm, and leg on the same side of the body, or of the arm and leg only Diplegia is paralysis affecting similar parts on both sides of the body, thus, bilateral paralysis of the face is a facial diplegia Paraplegia is a form of diplegia involving the lower extremities Tetraplegia is paralysis of all four extremities Monoplegia means paralysis of a single extremity

In analyzing paralysis, the first problem is to rule out nonneurologic causes of weakness These are pain and consequent reluctance to move, fixation of joints, lassitude, and psychogenic disorders Pain and fixation of joints are easily determined factors Lassitude is lack of energy with preservation of muscular strength, such as occurs in generalized infections or depression, it is diagnosed by finding normal strength when the patient is strongly urged to perform particular movements

Patients suffering psychologic disorders often have bizarre sensory changes, not corresponding to anatomic distributions The deep reflexes may be absent, normal or hyperactive, but are always symmetric in the patient without organic disease Incontinence of bowel or bladder is rare in psychologic disorders Electrical stimulation never reveals the reaction of degeneration The presence of psychopathologic factors does not exclude an organic disorder Many individuals will be found to have such factors if the inquiry is sufficiently thorough It is equally true that almost all patients with organic weakness have some psychogenic disorder because of their illness, and perhaps because of their pre existing mental status Hysteria is uncommon in old age unless it began earlier in life.

The paralysis of organic origin has reasonably specific patterns, such as the weakness of specific muscles resulting from interruption of the median nerve, or the characteristic posture in a hemiplegic patient with flexion of the arm and circumduction of the leg Pathologic associated movements,* reflex asymmetry, Babinski's sign,

* Examples of these movements are flexion of the thumb when the fingers are passively flexed, any movement of a paralyzed limb when the opposite normal side is moved, and dorsiflexion of the foot when the knee is flexed

atrophy with fasciculations, and the pattern of paralysis form the basis for diagnosis of organic disorder In psychologic disorders one may encounter contractures, atrophies, symmetric hyporeflexia and hyperreflexia, Hoffmann's sign bilaterally, and clonus Older persons may have symmetric loss of deep reflexes without organic disease

If pain, mechanical difficulties, lassitude, and psychogenic disorders have been excluded in the study of paralysis, the physician then should establish anatomic and etiologic diagnoses Where is the lesion or lesions? What is the nature of the lesion?

For clinical purposes one should consider motion as a response of muscle innervated by (1) a lower motor neuron with cells originating in the anterior horns of the spinal cord and in the brain stem, and (2) an upper motor neuron or suprasegmental system, with cells originating above the spinal cord The suprasegmental system conventionally is divided into two parts the pyramidal or corticospinal and the extrapyramidal Lesions of the extrapyramidal system rarely cause paralysis, although rigidity may cause slowing of motion and the patient may complain of weakness The consideration of paralysis in this discussion therefore deals with the upper motor neuron (here used synonymously with the corticospinal tract), with the lower motor neuron consisting of the anterior horn cell and peripheral nerve, and finally with muscle The last of these types of paralysis although not arising because of a lesion in the nervous system often simulates the lower motor neuron syndrome and is therefore considered in this discussion

Paralysis caused by disease of the upper motor neuron results in spasticity of the involved muscles Babinski's sign hyperreflexia and clonus and frequently pathologic associated movements Reactions to electrical stimulation of muscle and nerve are qualitatively normal Paralysis primarily involves the extensor muscles in the upper limb and the flexors in the lower limb This predilection type of paralysis is reflected in the [illegible] patients to learn to walk Spas [illegible] atrophy In this form of para [illegible] sudden in onset, flaccidity may be present at first but is replaced by spasticity in a few days or weeks Paralysis is rarely complete, and a muscle may be paralyzed in one movement, but not in another For example, a hemiplegic patient who is not able to extend the wrist on command may do so when he closes his fist

A lesion of the lower motor neuron results in flaccid paralysis with *muscular atrophy, loss of deep reflexes,* the absence of Babinski's sign and of pathologic associated movements, and the presence of electrical reaction of degeneration. Flaccidity is maintained as long as weakness is present, unless contractures supervene. To make an anatomic diagnosis, one must know the specific muscles made weak. A lesion of an individual peripheral nerve, for instance, causes weakness of the muscles supplied by that nerve. *Lesions of a nerve root may be diagnosed in this manner* by knowledge of the muscles supplied by the various roots. Lesions of the anterior horn cell usually cause weakness distributed more haphazardly. The presence of fasciculations aids in the diagnosis of the chronic types of anterior horn cell disease, especially amyotrophic lateral sclerosis. Paralysis is often complete in these conditions, and the muscles are weak in any movement.

Hemiplegia

This is weakness of the arm and leg on one side of the body, with or without involvement of the face. It is rare, although theoretically possible, for the lesion producing hemiplegia to involve only the cerebral cortex. The area on the cortical surface innervating the opposite half of the body is so large that it is not often altered completely. The corticospinal fibers are closely united in the internal capsule, however, and hemiplegia is frequently caused by a small subcortical lesion. The weakness is on the side opposite the lesion. The fibers remain together in the midbrain, are slightly more separated in the pons, and are gathered together again in the pyramid of the medulla oblongata Hemiplegia may be produced by lesions in these locations, although it is more frequently caused by lesions in the internal capsule. A lesion in the brain stem is diagnosed by the presence of cranial nerve signs on one side combined with hemiplegia on the opposite side ("crossed hemiplegia"). The lesion is then in the brain stem on the side of the cranial nerve palsy, and at the level of the nuclei of the paralyzed nerves. The least frequent location of a lesion causing hemiplegia is in the spinal cord below the medulla and above the fifth cervical segment. In this instance only, the paresis is on the same side as the lesion.

Hemiplegias may be sudden or gradual in onset, and may be

transient or permanent Those of sudden onset occur within minutes or hours up to an arbitrary limit of 48 hours Those continuing to progress for more than 48 hours are considered here as gradual in onset

Sudden Hemplegia

Rapid onset of hemiplegia most commonly indicates occlusion rupture or insufficiency of cerebral blood vessels Occlusion may be by thrombus or embolus Emboli occur in patients with the history and findings of rheumatic heart disease and its endocarditic sequelae In older people emboli are more often related to atrial fibrillation or to myocardial infarcts on the left side of the heart resulting in mural thrombi that are dislodged Evidence of atrial fibrillation or myocardial infarction is usually apparent

The differentiation of cerebral thrombus from hemorrhage is sometimes difficult and is of more than theoretic interest Some hemorrhages may be removed surgically Furthermore if anticoagulant therapy is to be used for the treatment of some forms of thrombosis as has been suggested by Millikan and his co-workers (1958) it is imperative that this condition be differentiated from hemorrhage (Table 23 2) The age of onset the previous history the onset with coma and convulsions and the level of the blood pressure are of no differential diagnostic value It is often stated that the patient with elevated blood pressure is more likely to have a *cerebral hemorrhage* but analysis of the figures offered by Aring and Merritt (1935) as well as personal data shows slight difference in systolic pressure in the two conditions and no significant statistical difference when the diastolic pressure is considered *Hemorrhage or thrombosis may occur with or without systemic hypertension* The nature of the onset is of some value in diagnosis if this history is obtainable The patient with a cerebral hemorrhage more often has a very rapid onset associated with headache and vomiting and this may occur at a time of activity or stress Cerebral thrombosis may be sudden or gradual in onset but seldom is preceded by headache and vomiting It often occurs during sleep Coma and convulsions may occur at onset in both conditions and although they are more frequent in hemorrhage the difference in incidence is too slight to be of value in an individual case

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The differentiation of cerebral thrombus from hemorrhage is sometimes difficult, and is of more than theoretic interest Some hemorrhages may be removed surgically Furthermore, if anticoagulant therapy is to be used for the treatment of some forms of thrombosis, as has been suggested by Millikan and his coworkers (1958), it is imperative that this condition be differentiated from hemorrhage (Table 23 2) The age of onset, the previous history, the onset with coma and convulsions, and the level of the blood pressure are of no differential diagnostic value It is often stated that the patient with elevated blood pressure is more likely to have a cerebral hemorrhage, but analysis of the figures offered by Aring and Merritt (1935), as well as personal data, shows slight difference in systolic pressure in the two conditions, and no significant statistical difference when the diastolic pressure is considered *Hemorrhage or thrombosis may occur with or without systemic hypertension* The nature of the onset is of some value in diagnosis if this history is obtainable The patient with a cerebral hemorrhage more often has a very rapid onset, associated with headache and vomiting and this may occur at a time of activity or stress Cerebral thrombosis may be sudden or gradual in onset, but seldom is preceded by headache and vomiting It often occurs during sleep Coma and convulsions may occur at onset in both conditions, and although they are more frequent in hemorrhage, the difference in incidence is too slight to be of value in an individual case

Some blood in the cerebrospinal fluid is present in 74 per cent of patients with cerebral hemorrhage, and this finding is the only pathognomonic sign. If blood is not found in the cerebrospinal fluid, a contained cerebral hemorrhage may be present, but thrombosis or vascular insufficiency is more likely. Other factors in favor of hemorrhage are a cerebrospinal fluid pressure greater than 400 mm of water, xanthochromia, stiffness of the neck and Kernig's sign, and leukocytosis. Pure blood and these signs also suggest subarachnoid hemorrhage, and occasionally a tumor may bleed.

TABLE 23-2. DIFFERENTIATION OF CEREBRAL THROMBUS AND HEMORRHAGE*

	Cerebral thrombus	*Cerebral hemorrhage*
Incidence (clinical)†	80%	15%
Age	Greater than 40	Greater than 40
Blood pressure	Systolic over 200 in 26% Diastolic over 100 in 52% Diastolic over 140 in 10%	Systolic over 200 in 40% Diastolic over 100 in 65% Diastolic over 140 in 11%
Other diseases	Arteriosclerosis, diabetes	Arteriosclerosis, diabetes
Onset	Sudden or gradual. Headache in 5%, vomiting in 6%. Often in sleep	Usually sudden. Headache in 63%, vomiting in 51%. Often in time of activity or stress
Coma	In 33% at onset, in 58% at time of admission	In 50% at onset, in 65% at time of admission
Convulsions	In 7% at onset	In 15% at onset
Stiff neck	In 7%	In 55%
Cerebrospinal fluid		
Pressure	Normal in 75%, never more than 400 mm. water	Increased in 60%, may be more than 400 mm. water
Blood	In 1.5%	In 74%
Color	None	Xanthochromic
Protein	Normal or slight elevation	Elevated
Leukocytosis	In 10%	In 55%

* Based on an autopsy-proved series of 116 hemorrhages and 106 thromboses reported by Aring and Merritt (1935).

† Cerebral emboli made up the remaining 5 per cent.

Bleeding into the cerebrospinal fluid must be distinguished from a "bloody tap" (*traumatic tap*), in which passage of the needle through paravertebral blood vessels causes blood to appear in the cerebrospinal fluid. The most reliable method of distinction is by the color of the supernatant fluid after prompt centrifuging. In the bloody tap, the supernatant fluid is clear, but when there has been

bleeding into the cerebrospinal fluid xanthochromia occurs within four hours and increases thereafter If any doubt arises about the color the test tube containing the fluid should be compared with a similar tube of tap water It is also helpful to collect the fluid in three successive tubes If the fluid clears as the cerebrospinal fluid flows a bloody tap is suspected Blood from intracranial hemorrhage into the spinal fluid results in a uniformly colored fluid and each of the three tubes will have a similar appearance and red cell count Bloody taps occasionally cause clotting of the spinal fluid but this apparently does not occur unless the red cell count exceeds 200 000 When the blood in the cerebrospinal fluid is the result of a cerebrovascular hemorrhage the fluid does not clot in the test tube because the fibrin has already been removed Crenation of red blood cells is not of value in this differentiation

The pressure of the cerebrospinal fluid often is increased in cerebral hemorrhage and may be more than 400 mm of water The pressure in thrombosis is usually normal and is never above 400 A greatly elevated pressure therefore suggests hemorrhage (or some other mass lesion) rather than thrombosis

It should be emphasized that the above data taken from Aring and Merritt (1935) are based on an autopsy proved series This circumstance undoubtedly weights the data in the direction of the more severe cases It is obvious that small nonfatal hemorrhages or thromboses would not be represented Many of the differential points [illegible]
The [illegible]
wh [illegible]
[illegible] with the individual patient, and more valid in a large series than in a single patient

Hemiplegia also may be caused by thrombosis of the internal carotid artery This results in hemiplegia with or without aphasia and may be sudden or gradual in onset or recurrent The internal carotid artery may be occluded at any level in its course but the most frequent site of thrombosis is the carotid [illegible]
Ophth [illegible]
but [illegible]
The [illegible]
ness [illegible] transient blindness unilateral blindness or homonymous hemianopsia, and pain in the eye The most characteristic combination is blindness in one eye and hemiplegia on the other side The ophthalmodynamometer also may be of

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Coma	In 33% at onset, in 38% at time of admission	In 50% at onset, in 68% at time of admission
Convulsions	In 7% at onset	In 15% at onset
Stiff neck	In 7%	In 55%
Cerebrospinal fluid		
Pressure	Normal in 75%, never more than 400 mm. water	Increased in 60%, may be more than 100 mm. water
Blood	In 1 5%	In 74%
Color	None	Xanthochromic
Protein	Normal or slight elevation	Elevated
Leukocytosis	In 10%	In 55%

* Based on an autopsy proved series of 116 hemorrhages and 106 thromboses reported by Aring and Merritt (1935).
† Cerebral emboli make up the remaining 5 per cent.

Bleeding into the cerebrospinal fluid must be distinguished from a "bloody tap" (traumatic tap), in which passage of the needle through paravertebral blood vessels causes blood to appear in the cerebrospinal fluid. The most reliable method of distinction is by the color of the supernatant fluid after prompt centrifuging. In the bloody tap, the supernatant fluid is clear, but when there has been

pairment of blood flow most commonly is caused by atherosclerosis, but a defective circle of Willis may play a role Polycythemia may cause hemorrhage as well as thrombosis

Diagnostic studies in hemiplegia of sudden onset should include a history and physical examination, blood count, analysis of the urine determination of the blood sugar and urea nitrogen, roentgenograms of the skull and chest, electroencephalogram and electrocardiogram If papilledema is not present, lumbar puncture should be performed to determine the presence or absence of white or red blood cells the height of the pressure, the protein content, and the reaction to tests for syphilis

Prognosis is determined by a combination of factors The state of consciousness after the first few hours offers a guide Continued coma is associated with a high mortality (Rankin, 1957) Other unfavorable findings are pupils fixed to light, whether dilated or constricted papilledema fever, hypertension, bloody cerebrospinal fluid and Cheyne Stokes respirations Favorable signs are maintained or restored consciousness clear cerebrospinal fluid, and normal pupillary reactions

The general care of the patient with hemiplegia is important An open airway must be maintained It is best to place the patient in the semiprone head down position to allow drainage of secretions He should be turned every two hours Repeated suctioning of the upper respiratory tract is irritating and should be avoided Tracheotomy may be required in the event that cyanosis is present and is not relieved by clearing the air passages or administering oxygen Respiration may be depressed by oxygen administration when carbon dioxide retention is high, because oxygen then blocks the stimulus to respiration The level of carbon dioxide in the blood is measured by direct determination but retention may be suspected clinically when the blood pressure rises rapidly

Fluid balance is maintained by intravenous administration of approximately 2,000 cc of fluids each day, distributed equally between a 5 per cent solution of glucose in distilled water and a 5 per cent solution of glucose in physiologic salt solution Strongly hypertonic solutions are not tolerated well by older patients If the patient has not returned to consciousness after two days additional nourishment should be supplied through a polyethylene gastric feeding tube Because of the danger of gastric dilatation

value if the occlusion is below the point of origin of the ophthalmic artery (Heyman, *et al*, 1957). Pressure in the retinal artery is then reduced on the side of the occlusion The pulsation of the carotid may be decreased in the neck or mouth Angiography of the vessels in the neck is the most certain method of diagnosis, but may cause further thrombosis, and therefore is not always indicated

Less common causes of hemiplegia of rapid onset include cerebral neoplasm or abscess, trauma, subdural hematoma, general paresis, and systemic disorders Hemiplegia owing to mass lesions is usually gradual in onset, but may be rapid, *whether the tumor is benign or malignant* (Netsky and Watson, 1956) Displacement of the pineal gland may occur with cerebrovascular occlusion, and should not be taken as proof of a mass lesion (Dron, *et al*, 1957) For these reasons, each person with a "stroke" should be studied carefully, and even when improvement occurs, should be re examined at regular intervals

Except for subdural hematoma, the usual types of trauma causing hemiplegia will be apparent from the history or examination Surgical removal of subdural hematomas is relatively simple, and it is unfortunate that they are often overlooked by physicians who dismiss the difficulty as a "stroke" or "cerebrovascular accident" Suspicion of subdural hematoma should be aroused (1) when a "stroke" fails to improve, (2) when neurologic findings such as hemiplegia, but especially the state of consciousness, fluctuate from hour to hour, (3) when increased intracranial pressure is found without localizing signs, (4) when a patient with neurologic signs has a history of alcoholism, or of trauma with even momentary loss of consciousness, (5) when the patient with a "stroke" has a dilated, nonreacting pupil Further detailed study is then warranted, and multiple trephinations or craniotomy may be necessary

General paresis is usually associated with intellectual deterioration, perioral tremor, and Argyll Robertson or irregular pupils, characteristic changes in the cerebrospinal fluid are always found in the untreated patient

It should not be forgotten that systemic disorders may result in sudden hemiplegia These include myocardial infarction, uremia, diabetic coma or hyperinsulinism, and polycythemia Hemiplegia may result when these conditions are superimposed on a cerebral circulation impaired by decreased blood flow on one side Im-

produce generalized vasodilatation with a drop in systemic blood pressure, and may actually cause harm by decreasing the cerebral blood flow

Similarly, the value of cortisone in reducing cerebral edema is questionable (Dyken and White, 1956)

More enthusiastic claims have been made for anticoagulant drugs (Millikan, *et al.*, 1958), although their value is sharply limited in cerebral thrombosis They cannot dissolve a thrombus, nor can they restore infarcted cerebral tissue The use of these drugs is associated with many potential dangers The patient may have had a cerebral hemorrhage rather than a thrombus, or the infarct may be hemorrhagic; in such cases, anticoagulants may promote bleeding The treatment may produce hemorrhages elsewhere in the body, and the patient is subject to the constant threat of hemorrhage from trauma. The prothrombin time must be checked often, and sometimes the desired limits are exceeded (double the prothrombin time of the control) A decision has not been reached as to how long anticoagulant therapy should be continued, but presumably it would be for life, inasmuch as atherosclerotic plaques do not regress In cerebral thrombosis the value of anticoagulants, if it exists, would be in preventing extension of the thrombus and the occurrence of additional thromboses Anticoagulant therapy may possibly prevent sludging of blood (Meyer, 1958) More controlled data are needed before a final conclusion is reached

Massive intracerebral hemorrhage is usually fatal. If the hemorrhage is minor, the patient will recover spontaneously In recent years, attempts have been made to decide which patients fall between these two extremes, since such cases may respond to evacuation of the blood Treatment is otherwise as outlined for the care of the hemiplegic patient

The treatment of embolic infarction is also similar to that of thrombotic occlusion, except for the management of auricular fibrillation or myocardial infarction

Gradual Hemiplegia

Hemiplegia of gradual onset is most often related to growth of a cerebral neoplasm This diagnosis should be considered in any patient with progressive neurologic dysfunction It should be con-

about 200 cc of formula should be given every two hours rather than larger amounts at infrequent intervals

Excessive restlessness is controlled by applying mittens to the hands and securing the hands to the bed rails Barbiturates, as well as other sedatives and narcotics, should be kept to a minimum because they may further depress the central nervous system Convulsions are treated with Dilantin, and barbiturates should be used only to control repeated seizures

Infections are treated as they arise, but not prophylactically It is best not to insert an indwelling catheter if it can possibly be avoided External drainage should be used for the incontinent male patient If an indwelling catheter is inserted, tidal drainage to allow emptying every three hours should be used to prevent a contracted bladder An enema should be given every two days

Physiotherapy is instituted promptly after two days, beginning with passive exercise of each joint through a full range of motion, then encouraging active exercises as soon as feasible The patient or his family may be taught the methods of physiotherapy Speech therapy is of uncertain value for the aphasic patient, except to enable him to give some expression of his wishes, even though his speech remains agrammatical

Aside from general supportive care, specific treatment of the patient with a cerebral thrombus has in the past consisted largely of attempts to produce cerebral vasodilatation More recently, the use of anticoagulant drugs or cortisone has been advocated In a few instances of thrombosis of the internal carotid artery the occluding material has been removed, but with little effect unless the thrombectomy was done before cerebral infarction had occurred (Gass and Smathers, 1957)

Vasodilators were given on the assumption that a central zone of fully destroyed cerebral tissue was surrounded by a zone of partially damaged tissue The vasodilating agents used in the past included histamine, nicotinic acid, carbon dioxide, papaverine, and block or removal of the stellate ganglion Although occasional good results have been reported with these methods, it is doubtful whether such experiments have been well controlled There is at present no certain evidence that these methods are of value, and it is probable that, without therapy, the vessels surrounding the infarct react to the insult by dilatation Agents such as histamine

The relative incidence of brain tumors in the aged is considerably different from that in the general population (Table 23-3) The neoplasm most frequently encountered in old people is the highly malignant glioblastoma multiforme and this tumor is more common than in younger patients Metastatic deposits also are encountered often but meningiomas and acoustic neuromas are surprisingly common in later life These four neoplasms comprise more than 90 per cent of those occurring in older people Surgical intervention is always warranted when the condition of the patient permits because the histologic diagnosis can be established *only* in this way and because of the possibility of finding a benign tumor

Slowly progressive hemiplegias rarely may be caused by general paresis or viral encephalitides The use of complement fixation tests on the cerebrospinal fluid and blood will help to establish the diagnosis Recently it has been demonstrated that slowly progressive hemiplegia may be related to slow progressive occlusion of the internal carotid artery (see Sudden Hemiplegia above)

Transient Hemiplegia

Transient and [illegible] increased in [illegible] thrombosis [illegible] cannot be the cause of paralysis lasting a few minutes or hours or recurring hourly or daily In the *past* the concept of vascular spasm was invoked frequently to explain such short lasting paralyses This concept remains to be proved and is based largely on inferential evidence Transient hemiplegia may be caused by small thrombi producing small infarcts with rapid restoration of function by collateral circulation Transient hemiplegia may follow a seizure (Todd s paralysis)

More recently it has been suggested that transient drops in the systemic blood pressure may cause hemiparesis and this condition has been designated cerebrovascular insufficiency Hypotension reduces the cerebral blood flow and when atherosclerosis is present may cause damage to the region supplied by an incompletely occluded vessel Such falls in blood pressure may be spontaneous may result from drug therapy or may follow a myocardial infarct

The diagnosis of insufficiency of the internal carotid artery *is* suggested when there is a history of recurrent hemiplegia with or without aphasia The diagnosis of insufficiency of the vertebral and

sidered also if convulsive seizures begin in an adult If the patient suffers a cerebrovascular accident of sudden onset, but fails to improve within 48 hours, or if apparent vascular insults occur repeatedly with the same signs and symptoms, the suspicion of a mass lesion is increased It is clear that signs of increased intracranial pressure, such as papilledema, roentgenographic evidence of erosion of the sella turcica or shift of the pineal gland, headache, nausea, and vomiting all suggest the possibility of a brain tumor Other factors arousing suspicion include mental symptoms, especially when they are associated with focal neurologic signs, progressive deterioration of vision as an indication of papilledema (although this symptom may be related to glaucoma, optic atrophy, or retinal degeneration), and progressive defects in the visual fields

Roentgenograms of the skull and chest should be performed on all patients suspected of harboring a brain tumor The electroencephalogram may indicate focal slow wave activity suggestive of neoplasm Arteriography or visualization of the cerebral ventricular system may be necessary for definitive diagnosis Recently the use of radioactive isotopes has been advocated for localization

TABLE 23 3 RELATIVE FREQUENCY OF DIFFERENT TYPES OF BRAIN TUMORS

New Haven Hospital (758 patients of all ages)*	*Per cent*	*Mayo Clinic† (100 patients over 60)*	*Per cent*	*Montefiore Hospital‡ (100 patients over 60)*	*Per cent*
Glioblastoma multiforme	21	Glioblastoma m	35	Glioblastoma m	34
Metastatic tumor	13	Meningioma	25	Meningioma	30
Astrocytoma	11	Acoustic neuroma	22	Metastatic tumor	19
Meningioma	11	Metastatic tumor	11	Acoustic neuroma	8
Abscess	9	Pituitary tumor	3	Craniopharyngioma	3
Pituitary tumor	4	Astrocytoma	1	Pituitary tumor	2
Medulloblastoma	4	Oligodendroglioma	1	Hemangioblastoma	2
Acoustic neuroma	3	Hemangioblastoma	1	Astrocytoma	1
Hemangioma	3	Craniopharyngioma	1	Astroblastoma	1
Craniopharyngioma	2		100		100
Oligodendroglioma	2				
Unclassified glioma	2				
Others	15				
	100				

* Reported by Zimmerman *et al* (1956)
† Reported by Moersch *et al* (1941)
‡ Personal data

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Transient Hemiplegia

Transient and recurrent hemiplegia is a problem that has aroused increased interest in recent years It is obvious that the usual large thrombosis or hemorrhage cannot be the cause of paralysis lasting a few minutes or hours or recurring hourly or daily In the past the concept of vascular spasm was invoked frequently to explain such short lasting paralyses This concept remains to be proved and is based largely on inferential evidence Transient hemiplegia may be caused by small thrombi producing small infarcts with rapid restoration of function by collateral circulation Transient hemiplegia may follow a seizure (Todd s paralysis)

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The diagnosis of insufficiency of the internal carotid artery is suggested when there is a history of recurrent hemiplegia with or without aphasia The diagnosis of insufficiency of the vertebral and

basilar artery system is made by the combination of recurrent hemiplegia, often shifting from one side to the other, with signs of involvement of the cranial nerves, and cortical blindness Permanent paralysis may occur at any time in the course of the disorder

Anticoagulant therapy probably has its greatest value in the insufficiency states (Millikan, *et al*, 1958) Too little time has elapsed to judge the value of this treatment, however, inasmuch as the natural history of these diseases indicates that spontaneous recovery may occur When the blood pressure falls, mild vasopressor drugs such as ephedrine may be given to maintain the systemic blood pressure and hence the cerebral blood flow

Paraplegia

Paraplegia is complete weakness of both lower extremities The term paraparesis is used for partial degrees of paraplegia "Senile paraplegia" is not a single entity, but is caused by many different disorders The most common location of a lesion causing paraplegia is in the spinal cord below the cervical region, down to and including the cauda equina Less frequently the lesion may be in the cerebral cortex or subcortex, or in the peripheral nerves or the muscles The first decision to be made is whether the upper or lower motor neuron is affected Lesions of the spinal cord, cortex or subcortex may produce weakness of the upper motor neuron type Within the spinal cord, lesions above the level of the twelfth thoracic vertebra or the fourth lumbar segment of the spinal cord are associated with this type of weakness Most of the corticospinal fibers do not descend into the sacral region

Paraplegia related to a lesion of the upper motor neuron is the more frequent type, and may be rapid or gradual in onset Rapid onset occurs within hours, or up to one or two days The cause most often is sudden compression by tumor of the spinal cord or its blood vessels Tumors may compress the cord or its blood vessels, or may affect the spinal cord by causing collapse of vertebral bodies The destructive lesions include metastatic carcinoma, retroperitoneal sarcoma, and lymphoma Malignant tumors of this variety generally lie outside the dura By contrast, the benign meningioma and neuroma are almost always subdural

Compression may be made by an epidural abscess This type of

abscess will be suspected when decubiti or furuncles are present on the back, but may be unsuspected when it is metastatic from other sources Direct trauma may cause sudden paraplegia, but the history of an accident usually makes this clear Thrombosis of the anterior spinal artery, hematomyelia, or the pressure of an aortic aneurysm may cause sudden paraplegia In rare cases, sudden cortical paraplegia may follow occlusion of both anterior cerebral arteries

Sudden compression of the spinal cord results in an immediate flaccid paralysis with a sensory level affecting all types of sensation, and paralysis of both sphincters Reflexes are lost in the first days or weeks When this catastrophe occurs, the possibility of immediate surgical intervention should be considered If lumbar puncture reveals a high protein content or block in the Queckenstedt test, or if roentgenograms demonstrate vertebral collapse, erosion of pedicles or myelographic abnormalities, laminectomy should be done to reveal the nature of the tumor and afford a decompression Speed is necessary because function rarely returns if sudden paraplegia is allowed to progress for more than two days Decompression is warranted even in instances of malignant tumors, because it may prevent or delay loss of sphincter control

Gradual onset of paraplegia often is caused by slow growth of the tumors already discussed, or by degenerative disorders

The clinical picture of gradual compression of the spinal cord by tumor is a progressive spastic paraplegia Progression may occur over a period of weeks or months Pain of nerve root distribution is the most frequent initial symptom This occurs at the level of compression and is made worse by coughing straining, or sneezing Paresthesias are often described by the patient as numbness or tingling. Function of the urinary bladder is disturbed early or late in the course this dysfunction may be manifested as difficulty in initiating flow or as incontinence Examination reveals increased reflexes in the lower extremities and Babinski s sign The arms are not involved if the lesion is below the cervical segments of the spinal cord A sensory level is often present, usually affecting pain and temperature sensation, but also involving touch and posterior column sensibility

Amyotrophic lateral sclerosis may begin in the lower extremities, but widespread fasciculations and atrophy, together with involvement of the upper extremities, soon occur (see Tetraplegia)

basilar artery system is made by the combination of recurrent hemiplegia, often shifting from one side to the other, with signs of involvement of the cranial nerves, and cortical blindness Permanent paralysis may occur at any time in the course of the disorder

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Compression may be made by an epidural abscess This type of

of involvement of the posterior columns ataxia lightning pains and occasional visceral crises

Finally senile myopathy in which reflexes may be diminished may mimic the lower motor neuron type of paraplegia but significant sensory changes are lacking The muscles are firm on palpation Wasting of muscles is common in old people but seldom causes major weakness Contractures from disease may immobilize the patient but these are readily apparent

Senile changes of joints also may cause weakness and secondary focal atrophy but clinical and radiographic evidence of arthritic disease is present and significant neurologic signs are not found

Monoplegia

This term denotes paralysis of one extremity Monoplegia most often is caused by a lesion arising in the direct innervation of the extremity Involvement of the brachial or lumbosacral plexus or the peripheral nerves of the extremity is common Lesions affecting the anterior horn cells unilaterally are rare in old people except as a residual of old poliomyelitis A plexus lesion produces a lower motor neuron type of paralysis and is diagnosed by the distribution of the sensory changes and the specific muscles weakened The plexuses are most often damaged by trauma but aneurysm or infiltration by primary or metastatic neoplasms may be the causative agent

The peripheral nerves most frequently affected are the median ulnar and common peroneal Involvement of the sciatic nerve causes pain more often than muscular weakness (see Pain in Extremities below) The median nerve may be damaged by trauma but in older people especially women it is more often compressed in the carpal tunnel (Kremer *et al* 1953) If the lesion is at the wrist weakness will be found in the short abductor of the thumb the short flexor of the thumb and the opponens pollicis When the damage is above the forearm the additional muscles weakened are pronator teres flexor carpi radialis palmaris longus flexor digitorum sublimis flexor pollicis longus and flexor digitorum profundus I and II The sensory loss is on the radial side of the hand on the palmar surface and on the dorsum of the thumb and first two or three fingers

Syringomyelia may come on late in life, and is diagnosed by the dissociated sensory changes (loss of pain and temperature sensation and preservation of touch) as well as by the presence of atrophy, fasciculations, and trophic changes Subacute combined system disease is suspected when there is a macrocytic anemia, and when posterior as well as lateral column signs are demonstrated If the patient has been treated with vitamin B_{12}, it may be necessary to determine the absorbability of the radioactive form of the vitamin (Krevans, *et al*, 1956) In cases of pernicious anemia this vitamin is not absorbed from the gastrointestinal tract A parasagittal cerebral lesion must be considered in cases of paraplegia where typical sensory levels and pain are absent, and when investigation fails to disclose a lesion in the spinal cord or vertebral column The areas in the cerebral cortex that control the legs lie on either side near the mid-line, and may be damaged by tumor or subdural hematoma

Critchley (1956) has described subcortical paraplegia of gradual onset in which a hemiplegic patient becomes paraplegic In these instances, the patient remains immobile after onset of the hemiplegia, and with disuse the normal leg bends to assume the same position as the paralyzed limb Ultimately the two legs fit tightly against one another Signs of upper motor neuron involvement are found only on the hemiplegic side

Paraplegia secondary to lesions of the lower motor neuron may be acute in onset, but usually is gradual If the onset is rapid, the most likely diagnosis is a polyneuritis or metabolic alteration These are discussed more fully under Tetraplegia (below) because such disorders most often affect the hands as well

Paraplegia of gradual onset may also be related to polyneuritis In these cases, the weakness and sensory loss are in the distal parts of the legs Paresthesias are common Neoplasms in the cauda equina or compression of these nerves by diseases of the vertebral column causes gradual loss of function because of the large space in which the nerves are contained These neoplasms may be diagnosed by the clinical picture of pains in the legs, sensory changes in root distribution (rather than complete loss up to a given level), and paralysis of sphincters The ataxia of tabes may resemble paraplegia, but the hands are always involved to some extent, this diagnosis is made by the finding of pupillary abnormalities, signs

of involvement of the posterior columns, ataxia, lightning pains, and occasional visceral crises

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Compression of the ulnar nerve most often occurs at the elbow resulting in weakness of the flexor carpi ulnaris, flexor digitorum profundus III and IV, abductor minimi digiti, and adductor pollicis. The sensory loss is on the ulnar side of the hand, is usually similar on palmar and dorsal surfaces, and implicates the little finger, or the ring and little fingers up to the wrist. The radial edge of the sensory loss often is in the middle of the ring finger. Characteristic clawing of the hand often permits diagnosis by direct observation.

The common peroneal nerve probably is the single nerve most frequently affected in older people. Its position near the head of the fibula allows compression by crossing the legs or by a hard mattress during sleep. The muscles affected are the anterior tibial, the extensors of the toes, and the peroneal muscles. These move the foot up and out. Weakness of the anterior tibial muscle causes a foot drop and a characteristic steppage gait. The sensory loss is on the outer aspect of the leg and the dorsal surface of the foot.

Any older individual with a single nerve lesion not obviously related to trauma, compression, or a neoplastic or inflammatory infiltration should be investigated for diabetes mellitus. In diabetes, mononeuritis is less common than polyneuritis (Martin, 1953), but unsuspected diabetes may be first manifested by signs of affection of the peripheral nerves.

If weakness is of the upper motor neuron type and affects the leg only, a disturbance in the region supplied by the anterior cerebral artery should be suspected. Lesions affecting only the arm area of the cerebral cortex are uncommon, but suggest local neoplastic infiltration or thrombosis of a portion of the middle cerebral artery. Degenerative diseases such as amyotrophic lateral sclerosis usually are widespread, but in the early stages may affect a single extremity. Progression of the disease soon makes the diagnosis apparent.

Tetraplegia

This is paralysis of all four extremities. The lesions causing tetraplegia may be distributed bilaterally in the cerebral hemispheres, or in the brain stem down to and including the upper cervical region of the spinal cord. Tetraplegia may also result from wide-

spread involvement of the spinal cord or of nerves, as in polyneuritis, from disorder at the myoneural junction, or from widespread disease of muscle Generalized paralysis may also be related to metabolic alterations such as uremia, diabetic coma, or a rise or fall in the level of serum potassium

The diseases most commonly causing weakness in all four extremities include bilateral cerebrovascular accidents, insufficiency or thrombosis of the basilar artery, amyotrophic lateral sclerosis, subacute combined degeneration, syringomyelia, and compression of the brain stem or cervical cord by extramedullary or intramedullary neoplasms All these produce the upper motor neuron type of weakness, although signs of lower motor disorder may also be present A combination of upper and lower motor neuron signs without sensory changes is suggestive of amyotrophic lateral sclerosis, and is diagnostic when widespread atrophy and fasciculations are combined with hyperreflexia and Babinski's sign bilaterally This is a clinical diagnosis, the various laboratory tests simply rule out other diseases Examination of the cerebrospinal fluid is within normal limits, and roentgenographic examination is usually unrevealing Myelography to rule out tumor should be done if the diagnosis is not clear, and there are no cranial nerve signs

The most common cause of tetraplegia of the pure lower motor neuron type is polyneuropathy This disorder may be caused by deficiency diseases, infections, or toxic agents The clinical picture is a diffuse, distal, flaccid weakness with pain and paresthesias, often with stocking and glove forms of sensory loss Mild and uncontrolled diabetes mellitus is often a cause (Martin, 1953) Elderly individuals who have a poor diet, who drink alcohol excessively, or who have absorptive defects may suffer from thiamin deficiency Many acute or chronic infections are associated with polyneuritis, but these usually are made apparent by the associated fever, leukocytosis, and systemic manifestations Lead, arsenic, and thallium are among the toxins to be investigated in polyneuropathy of obscure nature

Metastatic neoplasms may directly invade brachial and lumbosacral plexuses In addition, polyneuropathy associated with malignant neoplasms but not caused by direct invasion has been described (Henson, *et al*, 1954) The neoplasms may arise at any site, but most often are in the lung In these rare cases, the first mani-

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extending from an otitis media herpes zoster aneurysm and non specific inflammation

The facial nerve leaves the skull through the stylomastoid foramen Involvement distal to the foramen is most common and results in weakness of muscles innervated by the facial nerve without other neurologic signs The nerve in this distal portion may be damaged by trauma exposure to cold parotitis or most commonly by unknown factors

Bells palsy should be treated conservatively if thorough investigation does not reveal a remediable cause The eye is protected with a drop of methyl cellulose each morning by glasses or if desired by an eye patch Suturing the eyelid is necessary only in severe or protracted cases Regular upward massage of the face prevents sagging of muscles Study of the reaction of degeneration after two weeks is helpful for prognosis Nerve anastomosis while rarely necessary for Bells palsy is indicated if recovery does not take place within nine months to a year

The central or upper motor neuron type of facial paralysis is diagnosed when movements of the upper part of the face are preserved Action of the frontalis muscle is normal but the orbicularis oculi is partially affected The lower part of the face is weak or paralyzed in voluntary movement but may move fully with emotional stimuli The weakness may be related to a lesion anywhere in the path from the facial area in the cerebral cortex through the posterior limb of the internal capsule down through the midbrain and pons The nucleus of the facial nerve is in the midportion of the pons and the supranuclear fibers decussate just above the nucleus If the face alone is involved the le

[illegible] progressive hemiplegia [illegible] be the first sign If facial weakness occurs alone it is most often caused by a small thrombus or hemorrhage A neoplasm or degenerative disease must be considered when the facial or bodily weakness is progressive

Bilateral facial palsy (facial diplegia) may occur in infectious polyneuritis in true bulbar palsy (a type of amyotrophic lateral sclerosis) and in pseudobulbar palsy better called supranuclear palsy Infectious polyneuritis is not common in the aged and is accompanied by other evidences of polyneuropathy in the extremities

festation of malignancy may be a polyneuropathy The cause is not known The existence of a primary tumor soon becomes manifest Thorough investigation of the chest is indicated in any case of polyneuropathy for which the cause is not apparent

Muscular dystrophy is uncommon, but not unheard of, in the elderly patient Polymyositis is more common, and may be diagnosed from the leukocytosis, increased sedimentation rate, painful muscles, associated dermatologic findings, and systemic manifestations The patient may improve with steroid medication

Myasthenia gravis, although it is most frequent in young people, may occur in persons past 60 This disorder may weaken muscles generally, but most often affects the eyelids, the muscles of ocular motion, and the facial and palatine muscles Weakness increases through the day, is relieved by rest, and the diagnosis is confirmed when strength returns after an intravenous injection of Tensilon Tensilon is for diagnostic purposes only, Prostigmin, Mytelase, and Mestinon are used for therapy

Facial Weakness

This form of paralysis is divided into central and peripheral types In the central type the muscles of the upper part of the face are spared If the entire side of the face is involved, including the frontalis and orbicularis oculi muscles, the weakness is of the peripheral or lower motor neuron type, and is called Bell's palsy The paralysis may be due to a lesion in the pons, in the posterior fossa between the pons and the internal auditory meatus, within the temporal bone, or in the facial nerve after its exit from the skull The suspicion of a lesion in the pons is raised if there is associated weakness of the sixth cranial nerve, motor or sensory loss in the distribution of the fifth cranial nerve, affection of other cranial nerve nuclei, or hemiplegia Pontile disease may be caused by hemorrhage or thrombosis, neoplasms, or syringobulbia

If the lesion is in the posterior fossa, unilateral deafness usually is present also Lesions within the temporal bone will cause loss of taste in the anterior two thirds of the tongue, and increased auditory acuity if the seventh nerve is affected above the branch to the stapedius muscle The common disorders of the posterior fossa and temporal bone are tumors of the cerebellopontine angle, infection

severe enough to awaken him or to keep him from sleeping, and how it is relieved or made worse

This discussion will be limited to the common painful neurologic syndromes occurring in the aged, and will be divided according to the affected regions of the body

Facial Pain and Headache

When pain in the face is the complaint, an attempt should be made first to discover any obvious local disease such as glaucoma, foreign bodies in the eye, conjunctivitis, sinusitis, superficial tumors, or herpes zoster The location of the pain may be of value in diagnosis If pain is in the region of the mandibular joint, the cause might be arthritis of the temporomandibular joint, poorly fitting dentures, or malocclusion of the jaws Roentgenograms will reveal the degree of arthritic changes Diseased teeth may be the cause of pain referred into the face

Herpes zoster is most common in the first division of the fifth cranial nerve, and usually leaves scars or vesicles, in addition, other cranial nerves frequently are involved Older persons are especially liable to postherpetic pain This complication is extremely difficult to control If the usual analgesics are of no value, Protamide or Thorazine may be tried, and finally section of the appropriate sensory root

When the pain is in the distribution of one of the branches of the trigeminal nerve, some involvement of this nerve is obviously suggested The fifth nerve may be compressed by metastatic or primary tumors at the base of the brain, or by aneurysms, but in these instances signs of sensory or motor involvement of the trigeminal nerve are usually found The signs include loss of sensation in the face, loss of the corneal reflex, weakness of masseter, temporalis, and pterygoid muscles, and unilateral loss or excess of lacrimation or salivation

A common painful syndrome occurring in older people is trigeminal neuralgia (tic douloureux) This pain is most often paroxysmal and characteristically is in the second or third division of the fifth cranial nerve First division pain is found in only 5 per cent of all cases The pain of tic douloureux may be almost continual, but usually remissions last weeks or months It is often sharp, but may

True bulbar palsy results in wasting and fasciculations of the tongue and other affected muscles; in addition, other parts of the body may be involved. Supranuclear palsy results in similar evidence of bulbar (medullary) involvement: dysarthria, dysphagia, and *weakness of the tongue*, but atrophy and fasciculations are lacking, and the jaw reflex is hyperactive. There is usually a history of mild "strokes," and uncontrollable and inappropriate (pathological) laughing or crying may be present.

PAIN

Pain in the present discussion is related to diseases of the peripheral or central nervous system. Pain fibers originate as naked nerve endings or other receptors distributed unevenly in the skin, and are then situated in the peripheral nerves, *entering the posterior root* to synapse in the posterior horn. The fibers of the second relay cross the mid-line of the spinal cord and form the lateral spinothalamic tract. They enter the lateral nuclei of the thalamus in the posteroventral group. Most pain fibers then ascend in the posterior limb of the internal capsule to the postcentral gyrus in the parietal lobe, although this last projection is not known with certainty. *Other pathways for pain must exist, because analgesic areas may* still be painful.

It is important to distinguish between pain and the *response* to pain (see Chapter 6). Pain itself does not have a uniformly acceptable definition, and is difficult to measure. The clinician deals with responses to pain that differ with each individual. The *same* painful stimulus in one patient may cause no response; in another, a short cry; and in still another, repeated visits to the physician. It is generally stated that the appreciation of pain is dulled in old age; disorders such as coronary thrombosis are extremely painful in younger persons, but may occur without pain in an older individual. Despite this, the complaint of pain is common in the aged. The presence of pain is determined by the history. The intactness of the usual pathway for pain is studied by sticking the skin with a pin. The reaction of the patient to pain may be judged by applying deep pressure or other painful stimuli. The patient should be asked where the pain is; where it radiates; when it occurs in relation to time, emotion, and meals; whether it is sharp or dull; whether it is

severe enough to awaken him or to keep him from sleeping, and how it is relieved or made worse

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be dull in the aged patient The pain is usually unilateral, runs parallel to the jaw, and is precipitated by trigger mechanisms such as facial movements, drinking cold liquids, or touching specific regions of the face Neurologic examination fails to disclose any significant abnormality except the trigger zones Medical therapy is of little value in this condition, and some form of surgical intervention is necessary if the pain is severe and is not relieved by analgesics Injection of alcohol into the involved segment of the nerve, compression of the sensory root, and section of the nerve are alternative surgical methods

Headache coming on for the first time in an older person or headache undergoing a complete change in character is suggestive of organic disease The headaches of migraine and muscular tension so common in the younger person, do not often begin in late adult life Migraine usually, but not always, disappears soon after the climacteric

As with facial pain, it is necessary first to rule out local disease causing referred pain called 'headache" by the patient Systemic disease associated with anemia, hypertension, or hypertensive encephalopathy may result in headache, the underlying condition is readily diagnosed Temporal or cranial arteritis is peculiar to the senium (Meneely and Bigelow, 1953) The involved artery is painful, distended, and extremely tender Thrombosis of the retinal artery causes visual impairment Fever, leukocytosis, and elevation of the sedimentation rate may be present

Headache is common in subdural hematoma (see Sudden Hemiplegia, above) The headache of subarachnoid hemorrhage secondary to rupture of a cerebral aneurysm is sudden in onset, severe, and often followed by unconsciousness Unruptured cerebral aneurysm and vascular anomalies may also cause headache, but the former is often associated with weakness of the third cranial nerve The headache of brain tumor is a dull, steady, deep ache, often intermittent It occurred as an early symptom in 23 per cent of patients with brain tumors (Moersch, *et al*, 1941), but is more frequent in tumors below the tentorium than in those above Evidence of progressive neurologic involvement, indications of increased intracranial pressure, and focal electroencephalographic changes help to establish the diagnosis (see Gradual Hemiplegia, above)

Headache is the initial symptom in most patients with cerebral

hemorrhage, and in some instances of cerebral thrombosis (Table 23 2) It may be the first manifestation of depression, as in involutional melancholia Intoxication with bromide or other drugs may also be a cause of headache in elderly people (Garland, 1955)

Pain in Extremities

Painful sensations in the extremities are a common complaint in the aged, and require careful investigation When the cause is vascular insufficiency, the pains are made worse by exercise, palpation reveals decreased or absent pulses Neuropathy owing to nutritional deficiency is a frequent cause, this is diagnosed by weakness of the distal portions of the extremities, sensory changes in the stocking or glove distribution, and the location of the pain (see Tetraplegia, above) Loss of reflexes is of less significance in the aged (Table 23 1) Neoplasms infiltrating nerves, nerve roots, or plexuses may cause pain, but these are soon diagnosed

Acroparesthesia is a painful tingling sensation in the hands and fingers usually without objective neurologic findings It frequently occurs in slight persons with drooped shoulders They often wake up at night complaining of pain and are relieved by moving about A narrow thoracic outlet may be responsible The radial pulses should be checked with the head forward and then turned far to the sides with the arm abducted at the elbow, with the arm overhead, and with the shoulders brought back If these maneuvers cause disappearance of the pulse, a narrow thoracic outlet compressing the subclavian artery or brachial plexus may be suspected Strengthening the shoulder elevators may give relief

Median nerve compression may cause pain in the fingers on the radial side of the hand (see Monoplegia, above) The characteristic sensory and motor changes make the diagnosis Ulnar nerve lesions cause pain in the last two fingers The sensory loss may affect [illegible] exter[illegible] finger, and may even lated [illegible], pernicious anemia often begins [illegible]ined degeneration re[illegible] extremities This disease is detected by the presence of posterior and lateral column signs a macrocytic anemia, and in obscure cases by inability to absorb radioactive vitamin B_{12} from the gastrointestinal tract (Krevans, *et al*, 1956)

Spinal cord tumors have been discussed (see Paraplegia, above).

Pain in the extremities may be caused by osteoarthritis with or without herniation of the nucleus pulposus. These conditions are discussed in the chapter on the musculoskeletal system. Osteoarthritis may be diagnosed by roentgenography, but its role in causing symptoms cannot be determined with certainty except by myelography. Protrusions of the intervertebral discs are most common in the lumbar region, where the favored sites are the interspaces below the fourth and the fifth lumbar vertebrae; 95 per cent of all ruptured lumbar discs will be found in one of these two interspaces. The protrusion causes pain in the lower part of the back, radiating down the posterior portion of the leg. The pain is increased when the intracranial pressure is raised by coughing, sneezing, or straining. Straight leg raising is restricted on the painful side. Muscular weakness usually is not prominent. Diminution of pain and touch sensation is present in the fifth lumbar or first sacral dermatomes. The ankle jerk is often absent on the involved side.

Herniation of discs in the cervical region occur most often between the fifth and sixth vertebrae, or between the sixth and seventh. They cause pain in the neck and shoulder, with radiation into the arm and hand. Sensory diminution is found in the distribution of the sixth or seventh cervical nerve roots. Weakness may be minimal. The biceps or triceps reflex is decreased.

The diagnosis of protruded or herniated intervertebral disc is confirmed by myelography. Conservative treatment is best (Echlin, 1949), unless there is evidence of compression of the spinal cord, or the pain is not bearable. Surgical treatment is indicated also when adequate conservative therapy has failed.

Herpes zoster is diagnosed easily as a painful affliction of extremities in a spinal nerve root distribution, manifested by a vesicular eruption. In older persons it may be the first evidence of leukemia or other systemic diseases, and it may be followed by pain, even after the eruption has disappeared. Postherpetic neuralgia is extraordinarily difficult to treat with success.

Trunk Pain

Pain on one side of the body may occur after the onset of hemiplegia. This is extremely difficult to treat, as it does not respond

well to the usual analgesics Inasmuch as it may be related to peripheral vasospasm, the use of vasodilators or block of the sympathetic nerve fibers has been suggested as a therapeutic measure Thorazine may also be of value

Thalamic pain occurs in older people as a result of vascular damage to the nuclei of the thalamus The patient suffers a transient hemiparesis, thereafter examination reveals loss of position sense and an elevated threshold to pin prick, but an exaggerated reaction to stimuli when they are perceived The pain is deep, burning, and severe, and is difficult to alleviate Large doses of Thorazine and electroshock therapy have been used

Herpes zoster is most frequent in the thoracic region, and is almost always unilateral Treatment is symptomatic and is required chiefly for pain, especially after the eruption has subsided (see also Facial Pain and Pain in Extremities, above)

INVOLUNTARY MOVEMENTS

Tremor

Tremor is a rhythmic movement at a joint, brought about by alternating contractions of antagonistic muscles It is evidence of abnormal activity in the nervous system Destructive lesions alone, therefore, cannot explain tremor Irritative processes probably do not result in long continued involuntary movements, although tumors, scars and inflammations may be the cause of transient tremor For these reasons, sustained tremor is best interpreted as a release of viable neurons secondary to destruction of other nerve cells or fiber tracts Tremor, as well as most other involuntary movements usually disappears in sleep, or when the extremity is paralyzed. Lesions in the globus pallidus, the substantia nigra, the red nucleus, and the superior cerebellar peduncle may allow the release of activity of other neural structures, with resulting tremor The final impact of release phenomena is on the anterior horn cell

Clinical classification of tremor is difficult, because the speed of movement has many gradations in various diseases Tremor is called fine or rapid when the oscillations are about 10 times per second Slow or coarse tremor is at the rate of 3 to 5 movements per second

The tremor seen most often in elderly people is associated with

paralysis agitans (Parkinson's disease). This commonly affects the thumb and fingers of the hands, resulting in a slow "pill-rolling" movement at the rate of 3 to 5 times per second. The tremor is rhythmic, but from time to time changes in direction and amplitude. Similar movements may be seen in the head and jaw, and in the lower extremities. The movement is present at rest, is decreased or absent with motion, disappears in sleep, and characteristically is made worse by emotional stress and fatigue. The tremor at first may be on one side only, but it usually spreads to the opposite hand and ultimately to all extremities.

Paralysis agitans is associated with the increased muscle-tone known as rigidity. Rigidity involves the distal portions of the limbs, and is distributed uniformly in the flexors and extensors (lead-pipe rigidity). The increased tone may decrease momentarily as it is being tested (cogwheel rigidity). In the early stages, rigidity may be detected more delicately by having the patient contract the opposite extremity. This maneuver is performed best by having the patient place one hand on the examiner's arm, while the examiner tests tone in the patient's opposite hand by slow passive flexion and extension at the wrist or metacarpophalangeal joints. The patient is then asked to contract his hand on the examiner's arm. The examiner is able to detect the degree of volitional effort by the pressure exerted. When the parkinsonian patient contracts his hand, tone in the opposite side increases. This is a sensitive indication of increased tone in the early stages. Rigidity of facial muscles decreases expressiveness and eye-blinking, producing a reptilian stare. Paradoxically, blepharospasm frequently occurs when the forehead is tapped.

Associated movements, such as swinging of the arms while walking, are decreased. The patient takes little steps, movements are slow, and the posture is flexed. He may gather increasing speed when walking. Oculogyric crises are rare in the older patient and occur only in the postencephalitic type.

The cause of paralysis agitans usually is unknown; hence the term idiopathic. The role of atherosclerosis in the production of this syndrome is at present in debate. Parkinsonism on occasion may be related to carbon monoxide or manganese poisoning, or to viral encephalitis. An epidemic of the von Economo type of encephalitis occurred in 1919 and sporadic cases were recorded as late as 1926;

patients who were exposed during these times may suffer postencephalitic parkinsonism Other types of viral infections rarely may be followed by the parkinsonian syndrome

Treatment is similar regardless of the origin of the condition The available drugs include the solanaceous alkaloids, the newer synthetic parasympatholytic drugs, and antihistaminics Some of these medicaments are listed in Table 23 4 They should be given

TABLE 23-4 DRUGS USED IN THE TREATMENT OF PARKINSON'S DISEASE

Drug	Single dose	Chemical name	Value for Tremor	Value for Rigidity
		Solanaceous alkaloids		
Hyoscine	0 3 mg	Scopolamine-hydrobromide	+++	+
Tincture belladonna		Mixture of alkaloids	++	+
Rabellon	1 tablet	Mixture of alkaloids	++	+
		Synthetic parasympatholytics		
Artane	2 & 5 mg	Trihexyphenidyl	+	++
Cogentin	2 mg	Benztropine methanesulfonate	+	+++
Kemadrin	5 mg	Procyclidine hydrochloric acid	+	++
Pagitane	1 25 & 2 5 mg	Cycrimine-hydrochloric acid	+	++
Parsidol	50 & 100 mg	Ethopropazine hydrochloric acid	++	+
		Antihistaminics		
Benadryl	25 & 50 mg	Diphenhydramine		
Phenergan	12 5 & 25 mg	Promethazine		

in small doses at first, then the dose cautiously increased until therapeutic or toxic effects are obtained Toxicity is indicated by a dry mouth, blurred vision flushing, skin rash, vertigo, nausea, mental symptoms and urinary retention If a therap[illegible]

[illegible] reduced below the toxic level

The belladonna derivatives generally are more effective for the treatment of tremor and the synthetic drugs for rigidity, the antihistaminics are useful for insomnia Individual exceptions, however, are common The use of these drugs, therefore, must be based on a series of trials to determine the most effective combination I generally use scopolamine first then give Artane in combination with the determined dose of scopolamine, and then add Benadryl This combination may be effective for many weeks or months, and then

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in small doses at first, then the dose cautiously increased until therapeutic or toxic effects are obtained Toxicity is indicated by a dry mouth, blurred vision, flushing, skin rash vertigo, nausea, mental symptoms and urinary retention If a therapeutic effect is obtained before the toxic level is reached, the patient is maintained on this dose When both toxic and therapeutic effects are noted, the dose is reduced below the toxic level

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may lose its value In this event new drugs should be tried, and the older combinations reserved for use again at a later date Patients with glaucoma or urinary tract obstruction should be given these drugs with special caution, but these conditions do not contraindicate their use

Surgical procedures, chiefly chemopallidectomy, should be considered only after extensive trials of medical therapy and if the patient is badly disabled. Chemopallidectomy is of greatest value in patients with unilateral involvement, and also in younger persons (Bertrand, 1958). Older individuals can withstand bilateral intracranial procedures, but are subject to higher morbidity and mortality rates

Heredofamilial tremor (essential tremor) may occur at any age, including the senium A history of a similar condition in other members of the family is helpful The disorder is not associated with rigidity or weakness The tremor may be fine or coarse, is usually absent at rest (as contrasted with the parkinsonian tremor) and is brought on by motion or mental upsets Tremor affects the hand, neck, head, and face Treatment with antiparkinsonian drugs is ineffective Reassurance and explanation are the only treatment.

Senile tremor should be distinguished from parkinsonian tremor The senile type often is fine and rapid, but may be slow, thus resembling parkinsonism Senile tremor usually is not associated with increased rigidity, and hence rarely results in postural flexion, decreased associated movements, or slowness of movement The tremor affects the head first but later may involve the extremities When the hands are affected, the tremor may be made worse by motion It disappears in sleep The head may move affirmatively or negatively, and mandibular movements give the appearance of chewing The disorder has been attributed to atherosclerosis, but has been reported in patients without anatomic evidence of vascular disease Critchley (1956) believes senile tremors are a late form of heredofamilial tremor, but this connection is difficult to establish when a positive family history is lacking These tremors are of little significance aside from their distressing effect upon the patient and his handwriting or fine manipulations Progression is slow As with essential tremor, there is no effective treatment

Individuals of any age are subject to fine tremor when they over use alcohol, bromides, coffee, tea, or tobacco Some older people

are sensitive to these drugs Investigation of tremor, therefore, should include inquiry into the use of these agents Tremor related to psychoneurosis begins earlier in life Hyperthyroidism is discussed in another chapter in this book

General paresis may cause tremor and can occur in the senium, but it is recognized by the evidence of syphilitic infection in the blood and cerebrospinal fluid Elderly patients without syphilis may have pupillary abnormalities sometimes resembling the Argyll Robertson type as an accompaniment of age (see Cranial Nerves, above)

Chorea

This term is used for rapid involuntary movements occurring spontaneously and irregularly and appearing purposeless The choreic movements may interfere with voluntary motion giving the appearance of ataxia Choreic movements may occur in any striated muscle but not in involuntary muscle They may be widespread or limited to one side of the body to one extremity or to the face The muscles of articulation may be affected but ocular movements are almost never involved The movements on occasion may occur during sleep They are often accompanied by muscular hypotonia rather than the hypertonia associated with most diseases of the basal ganglions

There is no single anatomic locus for chorea Postmortem examination in some instances has shown normal basal ganglions abnormal basal ganglions or widespread disease of the cerebral cortex Chorea is a positive symptom and therefore cannot be caused by the destruction of cells alone It is necessary to assume that some cells perhaps cortical, are released from inhibition after destruction of other cells Chorea and athetosis frequently occur together hence the term choreoathetosis It is difficult to distinguish a slow choreic from a quick athetotic movement The two conditions are usually differentiated by the speed of movement athetosis being slow and writhing

Senile chorea comes on in late middle life or in the senium without evidence of mental deterioration Onset and progression are gradual, and the movements are generalized The diagnosis of Huntington's chorea should be considered if mental changes are also

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present Huntington's chorea usually begins in middle life, but may occur after 60 It may be diagnosed readily when there is a history of a similar disorder in other members of the family These patients ultimately require institutional care There is no specific treatment for the movements of senile chorea or for Huntington's chorea

Individuals with hemiplegia occasionally may suffer from choreic movements in the paralyzed limbs

Hemiballism, sometimes called hemichorea, is a continuous flinging movement related to a lesion in the opposite subthalamic body The lesion is usually vascular in origin (Whittier, 1947) Treatment is ineffective, and death soon occurs after the patient is exhausted by the ceaseless movements Some patients, however, may spontaneously recover

ATAXIA

Ataxia is inco ordination of muscles As used here, this definition includes the motor phenomena associated with cerebellar deficiency dysmetria inability to perform rapid alternating movements (adiadokokinesia), decomposition of movement, and tremor in action Ataxia is difficult to distinguish from weakness when the latter is present Cerebellar disease does not cause weakness except in the acute stages If weakness is present, diagnosis may be considered by the principles given in Weakness and Paralysis Tremor or chorea may prevent smooth movements and give the appearance of ataxia, but should be diagnosed readily because of the involuntary movements (see Involuntary Movements, above)

Ataxia without weakness may be sensory or motor in origin The ataxia caused by sensory loss is the result of a lesion in the posterior columns or peripheral nerves causing loss of position sense A lesion in the cerebellum or its upward projections causes a motor type of inco ordination

The senses of position and of passive movement are decreased in sensory ataxia The ataxia is worse when the eyes are closed There is usually no defect of speech, nystagmus often is not seen, and deep reflexes are lost If the lesion is in the peripheral nerves, other forms of sensation are lost, either in stocking and glove style or in the distribution of specific nerves or nerve roots

Cerebellar or motor ataxia does not cause loss of sensation Speech and posture are altered, nystagmus may be present, the deep reflexes are present and pendular, and the ataxia is usually similar with eyes open or closed The motor fibers of the cerebellum are distributed ipsilaterally, hence, a lesion in one cerebellar hemisphere results in ataxia on the same side If the damage to the cerebellum is widespread, the legs usually are more ataxic than the arms

Sensory ataxia in the older patient may be caused by the neurologic sequelae of pernicious anemia (subacute combined degeneration), tabes dorsalis, compression of the spinal cord, late forms of heredofamilial ataxia (Friedreich's ataxia), and polyneuropathy Subacute combined degeneration is diagnosed by the presence of posterior and lateral column signs, normal cerebrospinal fluid, macrocytic anemia and defective absorption of radioactive vitamin B_{12} (Krevans, *et al*, 1956) The presence of free hydrochloric acid in the gastric juice rules out this diagnosis, but achlorhydria is common in older people and is therefore not of diagnostic value

Tabes dorsalis is differentiated by the finding of posterior column signs, complaints of lightning pains or visceral crises, irregular or Argyll Robertson pupils, and abnormalities of the cerebrospinal fluid The loss of deep reflexes in the legs is common in old age, especially in the lower extremities (see Table 23 1), and therefore is not a reliable sign of tabes Compression of the spinal cord by tumor or vertebral collapse is considered in Paraplegia, above In *Friedreich's ataxia* of late onset, a family history of similar disorder is usually obtained, nystagmus, high arched foot, and kyphoscoliosis are found as well as signs of posterior and lateral column involvement Peripheral neuropathy is usually evidenced by the distal weakness and sensory loss (see Tetraplegia, above)

The following diagnoses should be considered when motor ataxia is found alcoholic intoxication, cerebellar neoplasm, frontal lobe neoplasm, senile cerebellar atrophy, hemorrhage or thrombosis of cerebellar blood vessels, and carcinomatous subacute cerebellar degeneration Ingestion of alcohol is usually determined easily, but special inquiry may be required The t[illegible]

... The intracranial manifestations of meningiomas

and metastatic tumors may be similar If a primary neoplasm is known, metastasis will be suspected, but the intracranial tumor may be the first manifestation The lung and breast are by far the most common primary sources (Lesse and Netsky, 1954) Ataxia and headache are the principal complaints Nystagmus, vertigo, and cranial nerve signs also may occur When these findings are pro gressive, a neoplasm is suspected Any evidence of increased intra cranial pressure would of course heighten this suspicion (see also Gradual Hemiplegia, above)

Acoustic neuroma often presents a characteristic clinical picture Tinnitus is followed by deafness, then by ataxia, vertigo, and signs of cranial nerve involvement The latter include facial pain, diminished corneal reflex and paralysis of the sixth, seventh and eighth nerves The cerebrospinal fluid protein is elevated, often to levels above 200 mg per 100 cc, and the affected side does not respond when the ear is douched with cold water

Symptoms of tumors of the frontal lobe occasionally may begin with ataxia The old diagnostic problem of differentiating tumor of the right frontal lobe from tumor of the left cerebellar hemisphere continues to be difficult clinically, but it can be resolved by air studies or arteriography Ataxia associated with a frontal lobe mass may be caused by damage to the frontal pontocerebellar fibers, by herniation of cerebellar tonsils, by compression of cerebellar pe duncles, or by apraxia Ataxia associated with changes in personality, focal motor seizures, or aphasia is more likely to be frontal than cerebellar in origin The electroencephalogram may reveal focal changes in the frontal lobe, and a pneumoencephalogram or arteriogram is necessary for further localization

Senile cerebellar atrophy may be considered as a variant of parenchymatous cerebellar atrophy, a degenerative disease affecting the cells of Purkinje The onset is slow and the patient notices progressive bilateral inco ordination, worse in the legs Speech is affected, but mentation usually is intact Nystagmus and other cranial nerve signs are not present The slow progression, absence of signs of increased intracranial pressure, and lack of involvement of cranial nerves help distinguish this disease from neoplasms in the posterior fossa

Cerebellar hemorrhage is sudden in onset, is associated with signs of meningeal irritation such as headache and stiffness of the

neck and is followed by cerebellar dysfunction and blood in the cerebrospinal fluid

Thrombosis of the posterior inferior cerebellar artery is easily diagnosed An older person has a sudden onset of vertigo, nausea, dysphagia and pain in the face without loss of consciousness Examination reveals involvement of the eighth, ninth, and tenth cranial nerves, and occasionally of the seventh, Horner's syndrome, cerebellar ataxia, and decreased pain sensation in the face on the side of the lesion, and loss of pain sensation on the opposite side of the body There are no pyramidal tract signs, and no loss of touch or position sense These findings are explained by the infarct on the lateral aspect of the medulla Treatment is symptomatic, and prognosis for life is good Syphilis may be the cause, but atherosclerosis is the most common pathogenetic factor

Subacute cortical cerebellar degeneration has been described in association with carcinoma elsewhere in the body (Brain, *et al* 1951) It will be recalled that an unexplained neuropathy may have a similar association (see Tetraplegia above) Unsteadiness of gait, diplopia, or skew deviation of the eyes is the presenting symptom Mental deterioration also may occur early in the course Death supervenes in less than a year

SYNCOPE AND CONVULSIONS

Syncope, or fainting is a sudden, brief loss of consciousness and muscular tone causing the patient to fall It is differentiated from vertigo in which the patient has a sensation of movement and does not lose consciousness Some types of seizures may produce the appearance of a faint, but the convulsive disorders are most often distinguished easily by the presence of tonic or clonic movements, or abnormal behavior during the attack Elderly individuals may have a transient loss of consciousness because of a fall in arterial blood pressure This type of vasodepressor syncope is probably the most common cause of fainting in old age Fainting usually occurs when the systolic pressure falls to 80 mm of mercury If unconsciousness lasts longer than 15 or 20 seconds, convulsions may ensue because of cerebral hypoxia Elderly individuals are also subject to orthostatic hypotension, in which fainting occurs when the erect posture is assumed

Changes in cardiac rhythm—cardiac standstill, paroxysmal tachycardia, or fibrillation—may cause syncope Carotid sinus sensitivity accounts for some episodes of syncope This should be tested with extreme caution in older persons, and the test should never be done bilaterally at the same time Emphysematous persons may retain carbon dioxide, and periodic decreases in respiration may cause carbon dioxide narcosis and recurrent fainting This phenomenon also may occur in fat people and has been described by Burwell and his co workers (1956) as alveolar hypoventilation or the Pickwickian syndrome Hypoglycemia is a cause of unconsciousness that may be suspected when the attacks occur hours after meals, and are relieved by feeding Recurrent episodes of thrombosis of small blood vessels may cause bouts of syncope, but these usually leave neurologic signs and result in mental deterioration

Convulsions are an important problem in the aged The most common cause in people over sixty is scarring secondary to vascular occlusion Next in frequency is a neoplasm or other mass lesion Additional possibilities include cardiac disease resulting in hypoxia, prolonged periods of cardiac arrhythmia, trauma, subdural hematoma, cerebral atrophic processes, uremia, and poisons

A detailed study is warranted whenever an unexplained convulsion occurs in an elderly individual This should include the history and physical examination, neurologic examination, roentgenograms of the skull and chest, electroencephalogram and lumbar puncture if papilledema is not present In instances of convulsion secondary to vascular disease, the past history often reveals an episode of sudden weakness with gradual recovery There is usually no evidence of progressive neurologic dysfunction The electroencephalogram may be normal or focally abnormal The cerebrospinal fluid pressure is not elevated, and its constituents are normal although occasionally the protein content may rise above 100 mg per 100 cc

Neoplasms, on the other hand, are most often associated with progressive neurologic dysfunction, although occasionally a rapid onset may be followed by temporary recovery The diagnosis of a brain tumor should not be abandoned because the patient improves (Netsky and Watson, 1956) Focal neurologic signs are most often present Evidence of increased intracranial pressure such as headache, nausea and vomiting, papilledema, and increased

pressure on lumbar puncture may be obtained. Elderly persons however, are less likely to have papilledema In a series of 100 older patients with brain tumor (Moersch, *et al*, 1941), choked disc was present in only one third of the cases. Absence of papilledema, therefore, does not rule out a brain tumor The cerebrospinal fluid protein often is elevated above 100 mg per 100 cc The electroencephalogram frequently reveals focal abnormalities, especially slow waves (see also Gradual Hemiplegia, above)

Despite these considerations, it may be difficult on occasion to be certain of the diagnosis If physical and neurologic examinations are unrevealing and the roentgenograms, electroencephalogram, and cerebrospinal fluid studies are all normal, it is probable that the patient had a vascular insult rather than a neoplasm All such patients, however, should be re-examined from time to time (White, Bailey, and Bickford, 1953)

If the decision is made that the disorder is not caused by a mass lesion, anticonvulsive medication should be given to prevent additional *seizures* It is best to begin with 0 1 Gm of Dilantin three times daily, and 0 1 Gm of phenobarbital at night If control of seizures is not achieved, Dilantin is increased to a dose just short of toxicity, and then if necessary Mysoline is added gradually until seizures are completely prevented Petit mal almost never begins in the elderly patient, but a drug such as Celontin or Tridione may be needed for seizures continuing from earlier in life

Neoplasms must be treated surgically, and age is no contraindication to surgical intervention The prognosis for patients with cerebral tumors is not as poor as is usually assumed, because resectable tumors such as meningioma often are encountered (see Table 23-3)

Subdural hematoma may be associated with convulsions Because this condition is surgically remediable, awareness of the diagnosis is important Subdural hematoma may be associated with focal neurologic signs and alterations of consciousness Characteristically the patient goes *in* and out of consciousness Roentgenograms of the skull may reveal displacement of the pineal gland, although a shift may not be present when subdural hematoma is bilateral A history of trauma, with or without loss of consciousness, is helpful but this history frequently is lacking Subdural hematoma should be considered when the patient does not improve after the

onset of convulsions and continues to complain of headache, drowsiness, and mental changes (see also Sudden Hemiplegia, above) Under these circumstances the patient should be studied further, and exploratory trephination performed

Occasionally convulsive seizures may be caused by degenerative processes resulting in cerebral atrophy Mental disturbance may be a prominent associated symptom, as in Pick's or Alzheimer's disease Seizures with or without other neurologic findings may occur without mental changes in the presence of atrophy of the brain This condition is diagnosed as "cerebral atrophy of unknown origin" Pneumoencephalography, the only certain method of demonstrating atrophy, reveals enlarged subarachnoid spaces, enlarged cerebral ventricles, or both There is no specific treatment for the underlying disorder, but the seizures may be treated by the method already described

Uremic convulsions are diagnosed by finding abnormalities in the urine and elevation of the urea nitrogen in the blood and cerebrospinal fluid Convulsions of cardiac origin are diagnosed by demonstration of the cardiac arrhythmia

Intoxication with alcohol may result in seizures, usually 3 or 4 days after indulgence The history reveals this factor, but these patients should undergo investigation, because ingestion of alcohol does not rule out a brain tumor, and subdural hematomas are common in patients with such a history Sudden withdrawal of long-continued doses of phenobarbital may also cause seizures

VERTIGO

Vertigo or dizziness is experienced as a sensation of movement of the environment (objective vertigo) or of the person (subjective vertigo) The more severe forms of vertigo are often associated with a sensation of movement of the environment The use of the term "dizziness" by the patient must be clarified by specific questions about a sense of rotation Patients may use this word for light-headedness or unsteadiness rather than true vertigo with a sense of movement Vertigo may be accompanied by other symptoms such as staggering, falling, pallor and sweating, nausea and vomiting, and diarrhea Nystagmus may be present Consciousness usually is maintained

The senses of orientation in space and of equilibrium are derived from many sources For neurologic purposes the important regions are the labyrinth and the vestibular portion of the eighth cranial nerve Other sources include the retinas the proprioceptors of the ocular muscles the joints and the muscles of the neck and of the extremities and trunk. Vertigo occurs whenever the information received from the different receptors is discordant For instance, the proprioceptors of the leg muscles may be stimulated when a normal person steps from a hard surface onto an extremely soft surface, giving a sensation of falling The retina then gives proper information and vertigo results from the discrepancy

It is useful to distinguish between peripheral and central sources of vertigo Peripheral vertigo arises in the acoustic nerve or ear, central vertigo in the brain stem cerebellum or cerebrum Peripheral vertigo is often associated with loss of hearing and almost always with nystagmus it is frequently paroxysmal Central vertigo is likely to be continuous and hearing is not usually altered, in addition there are other signs of disease of the central nervous system Acute lesions such as vascular occlusions produce vertigo more often than slowly developing tumors (Levy and O'Leary 1947)

Peripheral Vertigo

This is usually associated with loss of hearing The external middle or inner ear or the eighth cranial nerve may be affected Meniere's syndrome is rare in the elderly patient. Function of the labyrinth may be disturbed by such factors as wax in the external meatus blockage of the eustachian tube otosclerosis the use of drugs such as quinine Dilantin excessive tobacco or alcohol trauma and decreased blood supply due to anemia hypotension atherosclerosis or increased intracranial pressure Labyrinthine vertigo is usually paroxysmal Tumors of the eighth nerve especially the acoustic neuroma cause mild vertigo The acoustic neuroma is characterized by deafness decreased corneal reflex ipsilaterally nystagmus ataxia failure of the labyrinth to respond to stimulation by cold water and elevation of the protein in the cerebrospinal fluid The eighth nerve may be compressed by meningiomas atherosclerotic vessels aneurysm or arachnoiditis

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vessels Inhalation of carbon dioxide is the most potent cerebral vasodilator, and may be used if this effect is desired

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When vertigo is paroxysmal or severe, disease of the ear rather than the eighth cranial nerve should be considered

Central Vertigo

Central vertigo *most often arises in the brain stem or cerebellum,* and less frequently from the cerebrum The diagnosis is made by the *accompanying neurologic signs and symptoms Vertigo may* result from brain stem involvement if the vestibular connections *are affected Neoplasms, hemorrhage, or thrombosis, encephalitis,* and degenerative diseases such as syringobulbia may be causative *agents Such disorders inevitably are accompanied by other brain* stem signs These signs include dysfunction of the third to the *twelfth cranial nerves on one or both sides, and evidence of damage* to the corticospinal tract or the cerebellar pathways

Cerebellar disease produces vertigo if the vestibulocerebellar pathways are involved This may be the result of thrombosis of the *posterior inferior cerebellar artery (see Ataxia, above), of multiple* small thromboses, or of neoplasms Vertigo usually does not occur *in degenerative diseases of the cerebellum*

Vertigo of cerebral origin may occur in older people when they *stand up, probably because of mild cerebral circulatory insufficiency* Alterations of systemic blood pressure may cause vertigo *on the same basis High or low blood pressure may* affect the cerebral blood flow, but do not cause vertigo as long as the pressure *is maintained A drop in blood pressure may be caused by* anti hypertensive drugs or by cardiac dysfunction The heart, there *fore, should be investigated carefully in patients* complaining of vertigo The older person should be *protected as much as possible against alterations in blood pressure* Recurrent small cerebral thromboses may cause vertigo, but the downhill course and appear*ance of neurologic signs soon make* the diagnosis apparent Vertigo may precede cerebral thrombosis or hemorrhage, or may be the *aura of a seizure,* but again *the major manifestation is soon* appreciated

If the cause cannot be found, or if discovered cannot be relieved most types of vertigo may be treated symptomatically with Dramamine, Bonamine, or Marezine Vasodilators are usually unsatisfactory, because most of them have little effect on the cerebral

vessels Inhalation of carbon dioxide is the most potent cerebral vasodilator, and may be used if this effect is desired

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CHAPTER 24

Mental Disorders of the Aging

EWALD W. BUSSE

The mental disorders of the aging constitute a very serious and ever increasing medical and socioeconomic problem The real magnitude of the problem, however, can be stated only as an educated guess based primarily upon statistics obtained from mental hospitals According to the 1957 report of the National Committee Against Mental Illness, 38 per cent of all new patients admitted to mental institutions are past 60 Of all new patients admitted to public mental hospitals, 27 per cent have psychoses attributable to cerebral arteriosclerosis or other circulatory disturbances and senile disease Patients with senile psychoses make up 13 per cent of the resident population of all mental hospitals

The prevalence of disabling psychoneurotic reactions in elderly persons is difficult to determine statistically If such statistics were based upon the number of elderly psychoneurotics receiving psychiatric help the information would be misleading, because the medical profession as a whole has held a certain pessimism regarding the response of this age group to treatment (Hollingshead and Redlich, 1956) Fortunately, this attitude is undergoing a rapid change as it is being demonstrated that psychotherapy as well as appropriate medications can produce gratifying results

All individuals experience periods in their lives when their psychologic functioning is seriously impaired At what point can a physician justifiably make a diagnosis of an emotional or mental disease? Obviously, there is no strict line of separation between normal functioning and mental disorder Stress can produce a transitional zone that will merge into a definite disease when the

suffering individual recognizes his impaired function or discomfort and seeks relief. Also it is possible for society to decree that an individual is sick by indicating that his behavior is no longer acceptable and insisting that he receive medical attention. The role of society in determining the existence or nonexistence of sickness is particularly important with relation to elderly patients. Some segments of our society are perfectly willing to accept the individual who is showing changes of age and to continue to make a place for him in the community. Other segments are intolerant, and reject the elderly person at the first obvious evidence of decline in function.

This paradox brings us face to face with the concept of multiple etiology of mental disorders. Environmental stress is more apt to produce a mental disorder when it is acting upon reduced physiologic reserve. For a number of years investigators have known that some individuals with neuropathologic changes within the brain prior to death have exhibited few or no obvious mental abnormalities (Rothschild, 1937 and 1942, Critchley, 1929). Our own studies utilizing the electroencephalogram have demonstrated that some individuals who have severe brain wave disturbances consistent with organic changes can maintain a satisfactory adjustment within the community. This adjustment, however, can be maintained only as long as their tenuous physiologic balance is not tipped by additional organic disease or environmental pressures.

Although from a therapeutic standpoint it is well to recognize the concept of multiple etiology of mental disease, it must be stated that in many cases a single specific factor such as arteriosclerosis plays the major role in producing mental illness. Preventive measures and treatments must be aimed at the major etiologic agent, but all therapeutic regimens will take into consideration organic, psychologic, and environmental approaches.

CHANGES IN THE CENTRAL NERVOUS SYSTEM OF ELDERLY PEOPLE

Anatomic and Physiologic Changes

A number of distinct neuroanatomic changes are usually associated with advancing age. The brain decreases in size and

weight, and there is a compensatory increase in the amount of cerebrospinal fluid (Critchley, 1942 O'Leary, 1952) The dura mater is thickened and may contain small deposits of calcium It is claimed that there is a decrease in the number of nerve cells within the brain and that this loss of neurons is accompanied by gliosis (Brody 1953 Gardner 1940) The brains of elderly people who have shown normal mental functioning until the time of death often contain senile plaques similar to those found in patients with so-called senile dementia Although there is some correlation between the number of plaques and the degree of mental impairment the correlation is far from consistent (Rothschild 1937 and 1942 Critchley 1929)

Microscopically one sees neurofibrillar thickening and contortion and the deposition of argentophil material of unknown origin The characteristic accumulation of lipofuscin a pigmented substance composed of lipid and protein does not seem to interfere with neuronal functioning and its significance and origin are unknown Lipofuscin may be derived from mitochondria Andrew (1941) observed other histologic alterations such as hypochromatic staining of the Nissl substance nuclear basophilia, and vacuolization When any of these changes are found to be far advanced there is usually evidence of functional deterioration but further investigation is required before any definite behavioral correlates can be made

Surprisingly little is known about the physiologic changes associated with the aging nervous system Obrist (1954) and Busse and co-workers (1956) have focused attention on brain wave changes The slowing of the alpha rhythm normally found in elderly subjects becomes accentuated to an abnormal degree in association with psychologic decline Busse and his colleagues (Busse *et al* 1956 Barnes *et al* 1956 Silverman *et al* 1955) have demonstrated that a peculiar focal disturbance appears in "normal subjects" over the age of 60 as well as in subjects suffering from

are er cent of the dysrhythmias

ante 74 per cent of these in the

poral region This finding must be kept in mind when an electroencephalogram is being evaluated for diagnostic and clinical purposes as this focal disturbance can be misinterpreted to be evidence of a cerebrovascular accident or an expanding lesion

suffering individual recognizes his impaired function or discomfort and seeks relief Also it is possible for society to decree that an individual is sick by indicating that his behavior is no longer acceptable and *insisting that he receive medical attention* The role of society in determining the existence or nonexistence of sickness is particularly important with relation to elderly patients Some segments of our society are perfectly willing to accept the individual who is showing changes of age and to continue to make *a place for him in the community Other segments are intolerant*, and reject the elderly person at the first obvious evidence of decline in function

This paradox brings us face to face with the concept of multiple etiology of mental disorders Environmental stress is more apt to produce a mental disorder when it is acting upon reduced physiologic reserve For a number of years investigators have known that some individuals with neuropathologic changes within the brain prior to death have exhibited few or no obvious mental abnormalities (Rothschild, 1937 and 1942, Critchley, 1929) Our own studies utilizing the electroencephalogram have demonstrated that some individuals who have severe brain wave disturbances consistent with organic changes can maintain a satisfactory adjustment within the community This adjustment, however, can be maintained only as long as their tenuous physiologic balance is not tipped by additional organic disease or environmental pressures

Although from a therapeutic standpoint it is well to recognize the concept of multiple etiology of mental disease, it must be stated that in many cases a single specific factor such as arteriosclerosis plays the major role in producing mental illness *Preventive measures and treatments must be aimed at the major etiologic agent, but* all therapeutic regimens will take into consideration organic psychologic, and environmental approaches

CHANGES IN THE CENTRAL NERVOUS SYSTEM OF ELDERLY PEOPLE

Anatomic and Physiologic Changes

A number of distinct neuroanatomic changes are usually associated with *advancing age* The brain decreases in size and

sory function are limited to the minimum energy required to stimulate or whether the whole range of discrimination has been affected. Coppinger (1955) measured flicker fusion thresholds at three different brightness levels in young and elderly subjects. He found in the older group a much smaller absolute increase in threshold as brightness was increased. This finding indicates that increasing the magnitude of a weak stimulus will effect greater improvement in the judgment of an elderly subject than would be obtained in the judgment of a younger one.

Visual changes include a decline in color matching ability (Gilbert, 1957). The decline after 20 years of age is a gradual one so that the differences between adjacent decades are statistically very small. After the age of 60, however, there is a great variability in color matching.

The normal adult over 65 has been demonstrated to have cutaneous perception changes. The threshold to pain is increased and the elderly subject makes many perceptual errors when utilizing a double simultaneous tactile test (Green and Bender, 1953).

Psychomotor Skills

Speed of perception and psychomotor skills are the beginning and end of a process that is fundamental in life adaptation. In a young adult speed of psychomotor reaction may be influenced to a large degree by motivation or by other personality factors. Reaction times are definitely slowed for the elderly—or more precisely, the time interval between the stimulus and the motor response is lengthened. This is referred to as response latency. This slowing is independent of motivation and the lengthening of the time interval is due to changes within the central nervous system rather than in the afferent or efferent peripheral nerves (Birren, 1955). Elderly subjects not only respond slowly to a specific stimulus, but if the test is made more difficult they have more trouble than young subjects.

Intelligence Testing

The problem of measuring intelligence in elderly subjects is a complex one. To begin with, there is no universal agreement re

Other manifestations of change in the central nervous system include sensory loss and the absence or reduction of tendon reflexes (Critchley, 1942, O'Leary, 1952) Synaptic transmission has received some attention, but deserves considerably more investigation Reaction times slow down with advancing years Birren and Wall (1956), having demonstrated that the electrophysiologic characteristics of the peripheral nerves are normal, have concluded that the slow response to stimuli can be explained on the basis of alterations in central synaptic and neurointegrative mechanisms

Generally speaking, an old brain is more vulnerable to vascular insufficiency—a vulnerability that may be related to a narrowing of the safety margin as the cerebral blood flow diminishes with age This alteration in cerebral blood flow parallels the decline in cerebral metabolic rate (Fazekas, *et al*, 1952 and 1953, Freyhan, *et al*, 1951, Kety, 1955)

Chemical changes that have been reported within the brain include increases in sodium, lipid, calcium, and iron, and decreases in ascorbic acid, potassium, and, of course, water content

Perception

The human body might be considered as a very complex communication system that must receive stimuli and convert them into activity In such a complex system breakdowns can occur at many points The first to be considered is perception Clinical experience confirms the research conclusion that the ability to perceive certain stimuli alters with advancing age McFarland (1956), working with commercial air transport pilots, has clearly demonstrated that after the age of 60 there is a sharp decline in the recognition of high frequency sounds Sounds of 4,000 cycles per second at 30 decibels can no longer be heard by the average subject over the age of 10 There results the peculiar phenomenon that older pilots can hear better in a noisy aircraft, just as elderly people can often hear better in a noisy room

In a somewhat similar manner, the vision of older persons is much more impaired at low levels of illumination than that of younger individuals Szafran (1955) found that older persons benefit relatively more than younger ones from increased illumination This finding raises the question as to whether age changes in sen

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garding the definition of intelligence. Secondly, intelligence tests include a variety of components that are weighted differently in scoring. Components of mental tests include vocabulary, memory, learning, judgment, concept formation, imagination, and so forth. Speed of responses is often measured and heavily weighted. All intelligence tests are based upon memory and learning and memory ability clearly affects all spheres of psychic functioning. Intelligence tests, generally speaking, have been standardized on young people and specifically designed for young people. Application of such tests to older persons is certainly not wholly valid. Even tests standardized on elderly subjects must be used with caution until further work has been done. This fact has been clearly demonstrated by the work of Eisdorfer, Busse, Cohen, and Greenberg (1957).

CLINICAL ENTITIES

The following presentation does not include all the diagnostic categories that can be found in the *Diagnostic and Statistical Manual of Mental Disorders* (1954), but will be restricted to those disorders that are more frequent in the advanced years, have an etiologic relationship to the aging process, or present unique problems because of their serious impact upon an elderly person.

Disorders Caused by or Associated with Impairment of Brain Tissue Function

Diffuse impairment of physiologic functioning of the brain regardless of the cause, produces certain characteristic symptoms. Defects are found in comprehension, calculation, problem solving, learning and judgment. Orientation is faulty and memory is spotty. Emotional reactions are excessive and outbursts are easily precipitated. Interestingly, the symptoms are not always directly proportional to the extent of the physiologic disturbance, being over-determined by previous personality traits and the particular status of the individual at the time of onset of the organic pathologic process.

Organic brain disorders are separated for diagnostic purposes into two categories, acute and chronic. The term 'acute' is not used

to indicate a sudden onset of symptoms, but is meant to imply a reversible process

Acute Brain Disorders

Since by definition acute disease processes are reversible, the patient can be expected to recover normal physiologic brain functioning Acute brain disorders may be associated with infection (intracranial or systemic), intoxication (drug or poison), trauma, circulatory disturbances, convulsive disorders metabolic changes and nutritional deficiencies, or intracranial neoplasms

There is great similarity in the reactions associated with infection and intoxication Elderly persons, particularly those with cardiorespiratory disorders who are receiving medication, are particularly vulnerable to toxic agents The onset of symptoms may be insidious or rapid and the first symptoms likely to appear are fluctuations in memory, with impairment of retention Shortly thereafter, the level of alertness often becomes variable, ranging from mild confusion to complete stupor Hallucinations of all kinds can develop, and because of their bizarre quality they are often very frightening to the patient Anxiety is great, as these patients are often aware of the mental disturbance, which they cannot control, for this reason they weep easily and their mood is dominated by fear and apprehension Since the patient easily misinterprets what is going on around him, paranoid symptoms frequently develop In addition to the mental disturbances, the patient appears to be physically ill Vasomotor instability, manifested by flushing sweating or rapid and fluctuating pulse, is often present Moderate leukocytosis and fever are common Lucid intervals occasionally punctuate the mental confusion During such an interval, the patient will express fear of a return of symptoms, and complain of headache and general weakness

The treatment depends upon identification of the causative agent A careful history is often of more value than the physical examination and will indicate what laboratory procedures are necessary for diagnosis General supportive measures must be instituted quickly to prevent intensification of the physiologic disturbance Intravenous fluids and tube feedings may be necessary to maintain adequate fluid vitamin, and caloric intake Delirium is often helped by oxygen inhalation

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The physician must remember his patient's apprehensive state, and see that all procedures are carefully and repeatedly explained Repeated explanations *are necessary because the patient is very* fearful of his environment and is unable to retain information that is given him It is desirable for such patients to have a single room, which should be as well lighted as possible in order to minimize misinterpretation of shadows and activity within the room If it can be avoided, the patient should not be left unattended His anxiety can be reduced by the presence of a trusted member of the family *who is capable of explaining what is going on* Sedative drugs may complicate the picture, and for this reason they are avoided during the day, but adequate doses should be used at night to ensure needed rest

Unfortunately, the possibility that an acute brain disorder may have a prolonged deleterious effect upon the psychologic functioning of the patient is often overlooked The patient often realizes that he expressed certain bizarre thoughts and behaved in a very peculiar manner during the period of illness He feels guilty about what has transpired but is too embarrassed to discuss his concern openly For this reason the physician should review with the patient his behavior and verbalizations and assure him that they were *recognized as a product of the organic illness*

Elderly patients who suffer an acute psychic disturbance as a result of trauma frequently have an amnesia for the head injury External evidence of such an injury may be minimal or absent, as the force of a blow necessary to produce such a reaction is considerably less in an older person than in a young adult For this reason elderly persons are sometimes accused of alcoholic indulgence *when their disturbance in thinking* is actually the result of a head injury When there is doubt, chemical tests for intoxication should be made and serial electroencephalograms obtained if possible Treatment is conservative utilizing general supportive measures Such patients should be carefully followed so that a subdural *hematoma will not be overlooked*

Cardiorespiratory failure, by impairing circulation to the brain can produce a delirium In such cases the patient appears very ill and orthopnea is present The signs and symptoms of circulatory failure are the primary basis for the diagnosis, and treatment is aimed at correcting the failure

Diabetes and uremia are the most common metabolic disorders in elderly individuals, and should be considered whenever an acute mental reaction develops in an older person without obvious explanation

Chron c Brain Disorders

Since it is possible for the same patient to have both permanent and reversible impairment of cerebral tissue function, it is not surprising that improvement in the reversible changes should reduce the severity of symptoms during the course of a chronic brain disease Strictly speaking improvement beyond a certain level is not possible in chronic brain disorders, but rehabilitation and retraining can do much to compensate for losses The course of a patient with chronic brain disease is marked by frequent fluctuations in brain functioning These fluctuations are the result of many influences which include intercurrent infectious diseases as well as psychologic and sociologic determinants Hence, psychogenic disturbances are not infrequently superimposed upon a chronic brain syndrome (Rothschild, 1942) Like the acute brain disorders, chronic disorders are classified according to cause A number of the diagnostic categories are identical with those which subdivide the acute brain syndrome The differentiation rests upon the persistence of brain damage

Since organic brain disease is often an insidious process, history often reveals that the patient has been showing gradual mental changes for some time These include capricious defects in memory behavioral changes, errors in judgment, and deterioration of personal habits It is not unusual for an elderly person who is in a place of considerable authority to remain in such a position, in spite of obvious mental changes, until he makes some very unfortunate error in judgment Members of the medical profession are frequently asked for help in removing such a person from his place of authority The physician certainly has an obl ... upon ... led

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conti ...

in patients over the age of 60 ... Brain (1954) reported that males are affected four times more

frequently than females. Out of 200 patients over the age of 60 who were admitted to his service, 9.5 per cent were diagnosed as having neurosyphilis. Of clinical interest is the fact that no other chronic infectious brain disease seems to be as greatly influenced by previous personality as does that of syphilitic origin. The mental symptoms are definitely colored by the patient's previous patterns of social adjustment, occupation, and education. Because the treatment of neurosyphilis by penicillin is well established, it is important for the possibility of syphilitic brain disease to be kept in mind by every physician.

Posttraumatic personality disorders are observed in patients of all ages. For obvious reasons, psychogenic symptoms frequently confuse the picture following a head injury. In elderly persons the medicolegal aspects are complicated by the fact that trauma may aggravate a latent senile or arteriosclerotic brain disorder. Unfortunately, there is no way that this effect can be proved; and it is important to remember that a large number of apparently normal elderly people have temporal lobe disturbances on their electroencephalograms which could be attributed erroneously to trauma. This problem has been more fully discussed in an earlier portion of this chapter (Busse, *et al.*, 1956; Barnes, *et al.*, 1956; Silverman, *et al.*, 1955).

Cerebral Arteriosclerosis

While brain symptoms consistent with circulatory disease appear at the average age of 66 years, the disease may become manifest as early as 45. Strangely enough, symptoms are usually reported as having an abrupt onset. In such cases it is probable that the patient had had a very low physiologic reserve for some time, and that some intercurrent stress, often an upper respiratory infection, precipitated the sudden appearance of symptoms.

Cerebral arteriosclerosis is thought to be three times as common in the male as in the female. It is generally believed that hereditary factors play a significant role in atherosclerosis, and therefore in cerebral arteriosclerosis.

Some clinicians believe that in more than 50 per cent of the cases of cerebral arteriosclerosis there develops initially a delirious picture manifested by confusion, incoherence, and restlessness, and not infrequently accompanied by hallucinations. The delirium sub-

sides leaving the patient at a considerably reduced level of functioning From this point there is a gradual decline first involving memory and judgment Impaired judgment eventually affects many spheres including moral standards With the loss of emotional control, the patients become irritable aggressive and quarrelsome Not infrequently they realize that they are losing some of their intellectual ability Depressions then complicate the picture and suicidal attempts may produce a serious problem for the patient's family and physician

From a diagnostic viewpoint cerebral arteriosclerosis is difficult to distinguish from senile brain changes Both pathologic processes may exist simultaneously in the same patient Simon and Malamud on the basis of autopsy findings reported that almost two thirds of cases diagnosed as senile psychosis should have been classified as cerebral arteriosclerosis This error is probably attributable to the fact that the diagnosis of cerebral arteriosclerosis is based primarily on the history of a cerebral vascular occlusion As a rule patients with cerebral arteriosclerosis do not show the profound physical and mental decay of the senile patient Unlike the latter they often have *some insight* into their loss of mental ability They are less likely to sustain fractures of the bone and are more likely to complain of headache dizziness and fainting attacks They often suffer emotional outbursts and convulsive seizures The memory defect in a senile patient is more apt to be diffuse while in the arteriosclerotic it is *spotty and* fluctuates Both types of patients fabricate in order to make up for deficiencies The patient with senile psychosis is more apt to become involved in sexual indiscretions

Occasionally cerebral arteriosclerosis must be distinguished from Alzheimer's or Pick's disease Both of these diseases however have a much earlier onset and manifest a very gradual decline Alzheimer's disease does *not show* periodic periods of improvement

Many therapeutic approaches to the problem of cerebral arteriosclerosis have been attempted and a large number of these have attained some success Brain stimulants such as Metrazol and Meratran have been employed (Barrabee *et al* 1956 Klecmeier *et al* 1956) Attempts have been made to step up brain metabolism by using L-Glutavite (Katz and Kowaliczko 1956) Tranquilizers including Trilafon chlorpromazine and Promazine have been reported as useful (Ayd 1957 Smith *et al* 1957) Supplementary

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disease In contrast to cerebral arteriosclerosis, senile dementia is more common in women Approximately 50 per cent of patients with senile psychosis show only a gradual mental deterioration over a period of years In 15 to 25 per cent, however, paranoid symptoms develop In such cases the patient's suspiciousness and its effects on his behavior are very disturbing to his family and associates Such patients often change their wills because of paranoid delusions

In the section devoted to cerebral arteriosclerosis, attention was given to the differential diagnosis between these two disorders For an excellent review of the differential diagnosis of organic dementias and affective disorders in aged patients, the reader is referred to the publication by Ehrentheil (1957)

The anatomic changes characteristic of senile psychosis are adequately described in many textbooks of pathology and in other publications Unfortunately, the cause of these changes is unknown at this time, and no method for preventing or reducing them is available Therefore, treatment is concerned with the maintenance of adequate nutrition and the provision of an environment that is consistent, accepting, and stimulating within the limits of the patients abilities A limited type of psychotherapy can frequently prove useful and permit the patient to make a reasonably happy adjustment.

Cameron (1958) has reported the use of desoxyribonucleic (DNA) and ribonucleic (RNA) acids in 23 aged patients with memory impairment All 23 patients showed a favorable response, and in 50 per cent the results were considered good The best results were obtained in patients having severe memory deficits and marked confusion The side effects were minimum

Alzheimer s disease, probably the most common of so called presenile dementias was found in 4 per cent of patients examined at autopsy in a psychiatric institution (Rothschild and Kasanin, 1936) Although Alzheimer s disease is classified as a presenile dementia, there is considerable doubt that the pathologic process is related to the phenomenon of aging or that there is a hereditary predisposition as has been reported (Lowenberg and Waggoner, 1934, Mc Menemey *et al* 1939) It is probable that this disease has a multiple etiology (Lowenberg and Rothschild, 1931) Of all the organic disorders Alzheimer s disease is most likely to be accompanied by a distressing awareness of mental deterioration which may persist

vitamins alone are reported to have some success (Barrabee, *et al.*, 1956). Psychotherapeutically, a variety of approaches have been profitably employed, including individual psychotherapy, group psychotherapy, and attitude therapy (Goldfarb and Sheps, 1954; Allen and Clow, 1952; Wolff, 1957; Ginzberg, 1955).

Aged patients who are agitated and disturbed can often be helped by tranquilizers. As this is written, Trilafon seems to be the drug of choice; but only a therapeutic trial can determine whether an individual will respond to a particular medication. When the disturbed episode subsides, the dose of tranquilizer should be reduced and, if possible, eventually eliminated. Continued administration will build up a tolerance for the drug so that an increased amount will be necessary if agitation reappears.

Patients with cerebral arteriosclerosis do respond to a carefully regulated pattern of life. Tasks should be assigned that are within the limits of their ability and are in some way rewarding to them. Such activity is useful in preventing the appearance of irritability, outbursts of hostility, and depressive episodes with possible attempts at suicide. Alcohol and other medication with toxic qualities should be avoided.

Alvarez deserves credit for bringing to the attention of the medical profession the importance of so-called little strokes—thromboses of small intracranial arteries. These little strokes do not produce any lasting aphasia or hemiplegia, but are usually characterized by a dizzy spell, perhaps associated with nausea and vomiting, mental confusion, or a numb sensation in an extremity. They are often followed by persistent anorexia, abdominal discomfort, weight loss, and a personality change. Cortisone has been used in some instances, but Alvarez (1957) does not feel that it is worthwhile. He recommends that supportive measures be instituted and that the patient be relieved of excess stress. He thinks that iodides may help. If the patient is obese, he should be put on a reduction diet; but hypertension should not be treated unless it is severe and constitutes a grave threat to the patient's life.

Senile Dementia. The symptoms of this disorder may vary from mild to severe. Patients with mild cases merely become more self-centered, have difficulty in assimilating new experiences, and show a tendency to emotional outbursts. The superimposed psychogenic disturbance may be the more prominent element of the

over a rather long period During this time the patient requires considerable attention

Alzheimer's disease must be distinguished from Pick's disease and from senile and arteriosclerotic brain disease The patient appears to be overactive as compared to the one with Pick s disease, and emotional distress and agitation are more common In many cases the final diagnosis rests upon a pneumoencephalogram, which reveals a diffuse cortical atrophy as compared to the circumscribed cortical atrophy characteristic of Pick's disease The course of this disease is progressively downhill, and the average duration is approximately four years, though it can vary between two and ten years No specific treatment is known

Pick's Disease Although Pick's disease is also classified as a presenile dementia, there is again some doubt that it can be attributed to premature aging The only justification for calling these diseases presenile is their average age of onset—approximately 54 years for Pick's disease, although it may appear as early as the fortieth year Pick's disease is much rarer than Alzheimer s, and is approximately twice as common in women as in men Articles in both the European and the American literature point to a strong genetic factor (Lowenberg, *et al*, 1939, Delay, *et al*, 1945, Sanders *et al*, 1939)

The characteristic localized cortical atrophy is most frequently found on the orbital surface at the frontal lobe The precentral convolution is intact The second most frequent portion of the brain involved is the anterior insular region and the corpus callosum, and bilateral temporal involvement is next Occasionally the atrophic process affects the parietal and occipital lobes as well as the basal ganglion, but in these cases it first appears in the frontal or temporal area The localized nature of the atrophy produces aphasias, apraxias, and agnosias These patients are easily distracted, easily fatigued and have a great deal of difficulty dealing with new problems and new situations Depressive states are rare, but as deterioration continues, aimless activity and talkativeness can develop The talkativeness produces usually a meaningless jargon

Useful diagnostic features include apathy, inattentiveness, and total lack of insight Electroencephalographic studies are inconclusive, and confirmation of the diagnosis rests upon the pneu

moencephalogram (Delay and Desclaux, 1945) There is no known treatment for this disorder, and the therapeutic regimen is centered upon adequate supportive and environmental measures

DISORDERS PRIMARILY OF PSYCHOGENIC ORIGIN

The disorders of psychogenic origin include psychotic reactions, psychophysiologic reactions, and psychoneurotic disorders, as well as disturbances in the personality pattern Classifying these disorders as psychogenic does not rule out the very important influence of organic disease upon mental functioning of the individual Again it must be stated that the majority of mental disorders have a multiple etiology, but the disorders about to be discussed are attributed primarily to faulty thinking and behavior that result from inadequate or inappropriate learning

Involutional, Affective, and Psychotic Depressive Reactions

These three types of disorders closely resemble one another and
present a clinical
o ne others Depression is common to all three, and is the most common symptom found in functional disorders of the aging (Clow and Allen 1949)

Involutional Psychotic Reaction

During the so called change of life, many women have symptoms of involutional origin that do not reach the magnitude of a psychosis A variety of complaints develop, including feelings of discomfort restlessness, fatigue, and other somatic symptoms Crying spells and vasomotor instability are symptoms expected with the onset of the menopause The long debated issue of a male climacteric will not be entered into, but it seems reasonable that mental repercussions might occur in men whose sexual function declines more rapidly than usual

Psychotic reactions of the involutional period are more common in women than in men in a ratio of 8 to 3 This reaction tends to have a prolonged course At the outset the patient complains of inability to sleep, is very worried and anxious, and expresses feelings

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much poorer An attack of excitement occurring after the age of 40 is more likely to settle into a chronic state of mania

Psychotic Depressive Reactions

This type of reaction is distinguished from those related to involutional changes or to the manic-depressive pattern These depressions are primarily reactive in nature, a response to some particular recent life event Elderly persons are more apt to experience reactive depressions, since the latter portion of our life span is more likely to bring events that contribute to a loss of self esteem and threaten the established satisfactory pattern of life adjustment Reactive depressions can be considered either psychoneurotic or psychotic, depending upon the extent of the depressive symptoms The differentiation rests upon two factors (1) the extent to which the individual withdraws from reality and his ability to test reality, and (2) the degree to which he recognizes that he is not entirely responsible for his loss of self esteem and that all is not lost and hopeless

The prognosis of reactive depression is poor if the depression is accompanied by severe hypochondriasis, intractable insomnia, delusional material, or suicidal ruminations Psychotherapeutic and supportive measures are particularly effective if the patient has demonstrated a relatively stable pattern of life adjustment prior to the onset of the reactive depression In severe cases, electroconvulsive therapy must be considered

Paranoid Reactions

but only patients whose intelligence is well preserved and whose paranoid symptoms are consistent with their manifest emotions and behavior There is no denying, however, that this type of reaction is more likely to occur in a person who for some time has been sensitive and suspicious Such a patient, confronted with the inevitable changes of the later years of life, fails to accept them on a realistic basis and attributes his losses or failures to the hostility of other persons Delusions are usually well systematized and con

of self-depreciation and worthlessness If the depression continues for an extended period of time, paranoid thinking enters the picture and treatment becomes more difficult

From a diagnostic viewpoint, differentiation rests primarily upon the existence of physiologic changes typical of the involutional period, and the absence of a previous history of manic depressive swings The cause of involutional psychoses probably lies in the fact that the physiologic capacity of the central nervous system to adjust to endocrine changes is inadequate in some individuals The decline in estrogen in the female makes the nervous system more responsive and vulnerable to certain stresses

From a psychodynamic viewpoint, involutional reactions are almost always linked to conflicts in the sexual sphere, which are aggravated by the woman's realization that she is losing her reproductive capacities For a woman who has failed to satisfy her sexual needs or her maternal drive, the menopausal period can be filled with regrets, doubts, and guilt To enter into a detailed discussion of the complex psychodynamics is unwarranted, but the reader is referred to standard texts such as those by Fenichel (1945) and English and Finch (1954)

From a therapeutic viewpoint, there is no single approach that will be beneficial in the majority of involutional reactions Each patient must be individually evaluated and treated For instance, Brew and Davidoff (1940) have observed that two types of involutional psychoses responded to estrogen therapy, while the third severe type was resistant to it but responded very well to electroconvulsive therapy In severe depressions, electroconvulsive therapy continues to be the procedure of choice, though some of the new medications are proving useful Patients not requiring hospitalization will often respond to carefully planned environmental and psychotherapeutic approaches

Affective Reactions

Only a mention of affective reactions is justified in this presentation of mental disorders of the aging Manic-depressive reactions are characterized by severe mood swings, with a tendency to remissions and recurrences Generally the first severe episode occurs before the age of 40 years The prognosis for patients who experience the first manic-depressive episode after the age of 40 is

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Paranoid Reactions

Paranoid reactions in elderly persons are not infrequently combined with organic brain deficits This diagnostic category should not include those paranoid patients who are basically schizophrenic but only patients whose intelligence is well preserved and whose paranoid symptoms are consistent with their manifest emotions and behavior There is no denying however, that this type of reaction is more likely to occur in a person who for some time has been sensitive and suspicious Such a patient, confronted with the inevitable changes of the later years of life fails to accept them on a realistic basis and attributes his losses or failures to the hostility of other persons Delusions are usually well systematized and con-

cerned with such things as property, money, and relationship to neighbors As a secondary elaboration of their feelings of persecution, such patients often invest themselves with what they feel are special or unique abilities They conclude that the younger people around them are jealous of these skills and are putting them in a disadvantageous position in order to avoid competing with them

Deaf people and those whose sight is failing are more apt to become paranoid than those with normal hearing and vision Undoubtedly in elderly people the loss of hearing and visual acuity form a definite predisposition to paranoid tendencies Since a hearing defect has a much stronger predisposing effect than visual loss, every effort should be made to provide a suitable hearing aid in appropriate cases as soon as possible When deafness is present, there is a high likelihood that auditory hallucinations will occur

When an elderly patient of this type is examined, he is found to be, in spite of advanced years, alert, receptive, shrewd in his conversation, and quick to point out any minor inconsistencies that develop in the conversation Treatment of this type of patient is extremely difficult, and presents problems that cannot be solved solely through medical channels, but require the co operation of society Society must provide legal measures that can serve the best interests of the patient, his family, and the community

Psychophysiologic Autonomic and Visceral Disorders

The term "psychophysiologic disorders" is used in preference to "psychosomatic disorders" because the former specifies the etiology of the disease, while the latter is more aptly applied to a point of view held by the medical profession Psychophysiologic reactions are believed to represent both the physiologic expression of an emotion and the fact that the conscious recognition of this emotion has been repressed Consequently, patients in this category are unaware of the cause of the physiologic response that they are experiencing The symptoms of a psychophysiologic reaction are due to a chronic exaggerated state of a normal physiologic reaction accompanying an emotion

Unfortunately, the prevalence and treatment of psychophysiologic reactions in the aged have received very little attention Pruritus,

for example, is frequently mentioned as a serious problem in aging patients, yet I know of no reliable statistics concerned with the incidence of pruritus In our own experience the complaint of itching is practically nonexistent among so called normal, well adjusted aged subjects, although it is a common complaint of elderly patients in the skin clinic While it would seem reasonable to attribute itching to the senile changes in the skin, our preliminary observations suggest that this assumption is open to considerable doubt No definite conclusions are justified at this time, however, but must await further investigation

Arthritis is a very common complaint in elderly people Of the two major types of arthritis—rheumatoid and chronic hypertrophic (osteoarthritis)—the second is believed to be related to senescence The cause of osteoarthritis is far from clear, but many physicians agree that exacerbations of joint disease can be related to the emotional state of the patient It seems reasonable to assume that the physiologic strain produced by prolonged intense emotional reactions has its repercussions in the joints of elderly people The next logical step is to include in any therapeutic regimen the reduction or eradication of strong emotional stress (Kutner, *et al*, 1956, Weiss and English, 1957)

A survey of our own clinic indicates that the diagnosis of psychophysiologic gastrointestinal reaction is relatively common among patients past 60 The combination of causal factors to be considered includes a decrease in functional efficiency of the gastrointestinal tract with advancing years, and the narrowing of interests and centering of attention upon the basic functions of the body Elderly patients can easily become preoccupied with such matters as food, elimination of body wastes, and general body comfort Any change in efficiency of function will be observed and its significance exaggerated

In this regard Busse and his co workers (1955) found that approximately 25 per cent of well adjusted elderly persons require laxatives two to four times a week, and that 50 per cent of a large series of subjects over the age of 60 occasionally or habitually use laxatives Many subjects know that constipation can be related to some particular upset in life routine Since elderly people are more vulnerable to constipation, I believe that particular attention should be given to maintaining a well regulated life pattern Many of our

subjects noted that they became constipated when visiting in the home of an in-law where they felt unwanted, but not when visiting in a home where they felt accepted

Psychoneurotic Disorders

Anxiety is basic to the development of a psychoneurosis It is impossible in this presentation to discuss fully all the implications of the word, "anxiety" We must limit ourselves to a few fundamental facts To begin with, the manifestations of anxiety, both psychologic and somatic, are similar to those of fear, but anxiety differs from fear in that the threat or danger is partially or wholly unrecognized A person knows what he fears, but does not know what is making him anxious The physiologic sensation accompanying fear is recognizable to the individual as an appropriate response that prepares his body to deal with the danger Anxiety gives a similar sensation or warning, but the patient is not consciously aware of the source of the danger and so cannot deal with it on a realistic basis

All people have experienced such anxiety at some time in their lives, but such experiences are usually mild and transient and do not become seriously incapacitating If they are prolonged or intense, the anxiety can interfere with the patient's ability to work A psychoneurosis exists when anxiety interferes with efficiency of normal psychic functioning and behavior

Obviously, the fundamental mechanism in a neurosis is repression that is, pushing into the unconscious a recognition of the danger The existence of the repressed material and its constant attempt to break into consciousness result in the depletion of psychic energy The type of psychoneurotic reaction is determined by the way in which the patient attempts to handle his anxiety

The incidence of incapacitating psychoneurotic reactions among elderly persons is unknown The studies that have been attempted are definitely limited by a biased sample, biased criteria, or biased methods For instance, our own studies concerned with so called 'normal elderly subjects" are biased by our selection process Our subjects must be over the age of 60, relatively free of disease—particularly disease affecting the central nervous system—and apparently well adjusted and living in the community We have

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Another problem in the study of psychoneurosis is that the clinical picture is rarely so clear cut that it fits neatly into a specific diagnostic category All too often the clinician has to make a diagnosis of mixed psychoneurosis, with the qualification that one particular neurotic reaction pattern is dominant Our studies indicate that a core conflict of a neurotic nature can exist within a person for many years, while the manifestations of this conflict vary in response to the life situation This means that we see a kaleidoscopic picture of a psychoneurosis In accord with this observation, it has been demonstrated experimentally by Philip Seitz (1953) that one psychoneurotic symptom can be substituted for another It is true, of course, that not all psychoneurotic symptoms are equally satisfactory as a defense against a specific anxiety

Anxiety Reaction

When anxiety permeates widely the thoughts and behavior of a patient, it is referred to as diffuse When it is unattached—that is, unrelated to any experience or event, but more or less constantly present—it is called "free floating" This type of anxiety makes it impossible for the patient ever to feel secure or relaxed He is constantly trying to find an outlet for his anxiety, and moves quickly to and away from contact with people and various activities Anxiety is not limited to the daytime hours, and frequently produces disturbed sleep patterns or nightmares

The physiologic manifestations of anxiety include hyperventilation, profuse sweating, anorexia, nausea, and diarrhea When an older person becomes acutely anxious, he tries to find some tangible explanation for this anxiety, and therefore concludes that he is seriously ill In a state of panic, he seeks medical help When anxiety continues for an extended period of time, the somatic manifestations take on increasing import and it is very easy for the free floating anxiety to shift to concern with bodily functioning This is one of the psychodynamic explanations of the origin of hypochondriasis Further attention will be given to the chronic complainer in a subsequent section of this chapter

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depressive episodes in elderly subjects is related to their socio-economic level and state of employment. The percentage of unemployed or retired subjects who experienced depressive episodes varied from 44 to 48 per cent. The incidence dropped to 25 per cent in a series of elderly subjects who were continuing to work. One should be cautious, however, in concluding that work alone plays some vital role in preventing or decreasing the number of depressive episodes. It is possible that there is a fundamental difference which permits some persons to continue to work and also makes them relatively immune to depressive episodes. Another important defense against depression appears to be planned creative and recreational activity (Busse, *et al*, 1954 and 1955). The life history of those subjects with adequate planned creative activity reveals that this is not a newly developed pattern but one that has existed for many years. Although it is possible that elderly patients can develop such patterns of living, it is unlikely that they will develop them spontaneously or without the help of persons in their environment.

The physician should urge his older patients to maintain or develop work or activity that maintains their self esteem and as much independence as possible. Experience has shown that so-called hobbies are of little value to elderly people unless they result in something that is appreciated by others. A hobby that contributes nothing to others but merely occupies the time of an elderly person is an unsatisfactory defense against depressive episodes.

Suicide in Old Age

Individuals who attempt suicide do so for many reasons. Often suicide is the result of psychosis or severe psychoneurosis. In all countries where adequate figures are available, statistics show that the frequency of suicide increases in late middle or old age. A number of possible explanations for this fact are worthy of consideration. To begin with, an elderly person with an organic psychosis rarely attempts suicide. A suicidal attempt is much more likely to be related to a depressive episode that is superimposed upon a lifelong history of hardship. An elderly person who has had considerable difficulty throughout his life span seems to find the added problems of the advanced years too much to tolerate. Gruhle (1941) stated that suicide in old age can be attributed primarily

While tranquilizing drugs are useful in reducing the symptoms of acute anxiety, it is important for the physician to remember that removing the symptom does not affect the cause of the anxiety All too often the anxiety re-emerges when the tranquilizers are discontinued For this reason medication cannot be relied upon to the neglect of psychotherapy

Depressive Reaction

Periods of depression that are more or less incapacitating but do not require medical help develop in the lives of most people Evidence indicates that such depressive periods increase in frequency and depth in the advanced years of life Busse and his colleagues (1955), in a study of "normal" community volunteers over the age of 60 years, found that a significant portion of the subjects were aware that they were experiencing more frequent and more annoying depressive episodes The subjects reported that during such episodes they felt so discouraged that they often had no desire to continue to live Only a small number admitted entertaining suicidal ideas, but a much larger percentage stated that during such depressive periods they would welcome a painless death

Prior to this report Busse and his co workers (1954) had published their observation that guilt is apparently a relatively unimportant dynamic force in the psychic functioning of so called normal elderly persons Guilt and the turning inward of unconscious hostile impulses that are unacceptable to the ego are the common mechanisms in the depressions of younger adults This was not the case with elderly subjects The depressive episodes can be more readily linked with loss of so called narcissistic supplies The older subject becomes depressed when he cannot find ways of gratifying his needs, when, because of social environmental changes or the decreased efficiency of his body functions, he can no longer reduce his tensions by his own volition Approximately 85 per cent of the volunteer community subjects were able to trace the onset of most of their depressive episodes to specific stimuli These depressive episodes, therefore, were primarily reactive depressions The triggering stimuli were usually related to an experience associated with physical suffering, with lowered financial, professional, or social status, or with the loss of friends and relatives

Busse and his colleagues (1955) reported that the frequency of

who is unable to keep up with society's financial and social demands Such a person is rarely able to face the true cause of his failure but rather seeks to maintain his self respect by becoming "sick" and requesting that society provide him with financial and medical help

This retreat into illness can be used with reasonable success for variable periods of time but eventually the patient's family and acquaintances begin to question the validity of his complaints in view of the findings of the physician the individual's behavior when he feels he is not being observed and his physical capacity to do the things that he "wants" to do When friends and acquaintances recognize that the excuse of illness is physically unjustified they feel they are being exploited and express resentment Most people are governed by a strict conscience that will not permit them to "play sick" to get out of difficulty and this makes them resentful of the person who habitually uses illness as a defense

PSYCHOLOGIC FACTORS Psychodynamically there are three major components in the development of hypochondriasis The first is a withdrawal of the patient's interests from persons and his environment and a centering of his psychic energy upon himself and in particular upon his body and its functionings The second is the patient's utilization of restrictions and discomforts produced by his illness as a way of punishing himself and partially atoning for his guilt feelings These guilt feelings arise from the hostility he feels toward those close to him but which he is unable to express The third possibility is that the patient shifts his anxiety from some specific psychic conflict to a less threatening concern with bodily disease and functioning

It is obvious that a person in the advanced years provides fertile soil for the development of hypochondriasis The elderly person whose energy was formerly devoted to work or other social activities *now* has this energy to focus upon himself In addition he cannot risk expressing hostility because he is much more aware of his dependence upon others Therefore he must hold his feelings in check by turning them inward and directing them against himself Finally he finds that worry about his health is more *acceptable to himself* and to others than concern with his loss of social prestige or financial security

METHOD OF MANAGEMENT On the basis of the social influences

to social and psychologic factors, which in turn are related to the inevitable changes that our particular culture forces upon us in advancing years Many other factors must also be considered, however For instance, suicidal rates are higher in urban than in rural areas, lower in Catholic than in Protestant countries, higher among the unmarried than among the married, increased in times of unemployment and economic depression and decreased during war, and they are highest in the early summer Suicide rates among English women reach a peak between the ages of 45 and 64, while among English men the highest rate occurs beyond 64 This sex difference can be attributed to the menopause in the life of a woman and to the retirement of men at the age of 65 or thereafter

Hypochondriasis

Hypochondriasis is not a disease entity It is a syndrome consisting of an anxious preoccupation with the body or a portion of the body which the patient believes is either diseased or not functioning properly This bodily preoccupation can be associated with a variety of medical conditions, including neuroses, psychoses, psychophysiologic reactions, and personality disturbances Regardless of the underlying cause for his hypochondriasis, the chronic complainer tries the patience of both his medical advisers and his associates In our study of the prevalence of hypochondriasis among the adult population of a medical clinic, we found that chronic complaining was noted much more frequently in elderly patients

In an attempt to find a reasonable approach to therapy, we gathered the hypochondriacal patients together in a special clinic More than half of them were past 60, and the majority were women The therapeutic approach was based upon an understanding of the social, psychologic and medical factors that play a role in the etiology and maintenance of this syndrome

Social Factors In most western cultures great emphasis is placed upon financial success, the attainment of a position of authority, and the maintenance of personal independence Our society has little room for the individual who is a failure On the other hand, however, our Christian democratic ideals require that we provide medical care and financial assistance for those who are physically ill and do not have financial resources This social pattern provides a very usable escape mechanism for the person

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and psychologic mechanisms which have been discussed, a new therapeutic approach to hypochondriasis has been recommended (Busse, 1954, 1956a, 1956b) The first therapeutic principle is to avoid confronting the patient with the fact that his symptoms are "imaginary" or "all in his head" Such statements leave the patient defenseless, and only serve to increase his anxiety and arouse hostility towards the doctor, who he feels is accusing him of making up the symptoms The second principle is to avoid telling the patient's child, spouse, or friends that the chronic complaining is purely of psychic origin, as the person so informed will inevitably become angry with the patient and confront him with this particular knowledge When this happens, the patient feels that he cannot trust anyone and certainly not the physician

Third, the physician should be sympathetic, but must refrain from giving the patient a specific diagnosis or explanation When he is pushed for an explanation by the patient, he should indicate that he is not certain as to the origin of the problem, since the diagnostic procedures to date have not produced any definite leads, but that he realizes there must be an explanation and that the patient needs help He should assure the patient that he is willing to work with him, and should demonstrate his willingness by prescribing placebos or medications that will not confuse the clinical picture for example, tranquilizers He should be firm about making definite follow up appointments, and must be very careful to let the patient know exactly how long he will have allotted upon return visits For instance, the physician might say, 'I would like to see you again next Friday I will put aside twenty minutes for you, and this will give us an opportunity for me to examine you as well as to review with you all your difficulties"

These principles of therapy will help the patient to feel that the doctor is interested in him and is searching for the possible cause of his complaints When the patient knows that he has a specific length of time for each appointment, he will quickly find that he can utilize this time effectively by talking about his emotional as well as his physical difficulties As the patient releases his repressed feelings and finds ways to deal with them, the symptoms will subside This type of therapeutic approach, by preventing the hypochondriacal symptoms from becoming firmly fixed and therapeutically resistant, actually conserves the physician's time

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CHAPTER 25

Sociologic Aspects of Aging

BERNARD S. PHILLIPS

The complete impact of aging on any individual cannot be understood without taking into account his changing relationships to the social world around him Many of these changes take place without regard to the pace of the individual's physiologic aging Rules compelling retirement at a specified age, for example, do not take into account the physiologic status of the individual If we attempted to predict the total effect of the aging process in such cases from a knowledge of biologic changes alone, we would overlook occurrences of great significance for the health status of the person concerned Thus, it is necessary to develop an awareness of the patterns of sociologic as distinct from biologic aging

A person is sociologically old when he is so regarded and treated by the members of his society This treatment may be relatively obvious, as in the case of compulsory retirement, or it may be extremely subtle for example, a slightly patronizing manner of treating the older person

Awareness of social processes does not, of course, supersede understanding of biologic processes, but rather, complements it. It is the aim of this chapter to examine some of the social processes that have an important effect on the individual's total reactions to aging and thus to provide a more complete understanding of the impact of aging

In this era of rapid communication and transportation, we no longer have to be told by anthropologists that peoples throughout the world have greatly varying cultures or "ways of life" It is not surprising therefore, to find that aged populations do not receive uniform treatment in different parts of the world Although our primary aim is to gain awareness of the American situation, it is

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period of experience to turn out a really successful finished product

Sixth, the aged generally play a prominent role in the entertainment of the group They serve as storytellers, experts on the rules for various games, comedians, singers, dancers, and musicians

Seventh they provide a host of services that require little physical strength but furnish welcome support in such areas as hunting and fishing agriculture, household management, and care of children The aged thus may steer boats on fishing expeditions, or help in processing food

The seven sets of functions listed above give the aged a vital role in the life of the group The rewards that they receive, in turn, are manifold. Let us briefly examine two major types of rewards material goods and status or prestige

Even in societies where the physical environment is very harsh and difficult and where there is no constant source of food supply there are customs of sharing food with the aged Taboos that may be violated only by the aged are often placed on many choice foods In general the services rendered by the elders are adequately paid for and the various types of power that they hold help to ensure that the younger members of the community do not take advantage of their diminished physical strength Property rights are also an important source of security especially since the aged often decide on rights of inheritance

The prestige accorded the aged is manifested in diverse ways The heroes of legends and stories are frequently elderly individuals (A partial explanation may lie in the fact that the storytellers are recruited from the ranks of the aged) In the area of religion important deities very often are cast in the image of the aged Underlying these specific examples there usually exists a fundamental respect for the aged individual

It is no accident that such societal rewards as material goods and prestige are coupled with important services that the aged perform for the group Although the relationship of services to rewards may not be thought of consciously as a *quid pro quo* arrangement it still exists Without the performance of services we may hypothesize that the rewards received would diminish considerably One method of verifying this hypothesis is to examine the magnitude of rewards received by various individuals within a society in relation to the functions each individual performs

well worthwhile to acquire some bench marks for purposes of comparison by examining the situation of the aged in preliterate societies that are, of course, markedly different from our own What functions do the aged fulfill for these societies and, in return, what rewards do these societies accord to the aged?

THE AGED IN PRELITERATE SOCIETIES*

First, the aged provide an important source of accumulated knowledge in a wide variety of fields The lack of a written language makes the memory of elders extremely important, and puts them in a position to perform many valuable services They may be regarded as seers in such diverse fields as medicine, law, religion, general history, war-making, agriculture, hunting, and a wide variety of arts and crafts

Second, the elders often function in the capacity of witch doctors or magicians Their knowledge and long experience with religious rites and ceremonies put them in a strategic position for this role In addition, they are frequently thought to have a special affinity with the dead, and the fear of ancestral ghosts bolsters their position considerably

Third, the aged participate in making important decisions of policy for the group Their function here is not just honorary, but often gives them a great deal of power over the welfare of the community The treatment of those who violate group mores, for example, often comes under their jurisdiction

Fourth, the aged generally exercise a number of important functions for their family units The responsibility for instruction of children, including the teaching of moral precepts, is often placed in their hands In addition, they have an important voice in most key family decisions, such as those concerning the management of family property As family heads, they usually play a leading role in such rituals as puberty rites, weddings, and funerals

Fifth, the aged often supervise and participate in the highly complicated techniques necessary for the industrial and decorative arts These techniques may be so involved as to require a very long

* The general statements about the aged in preliterate society that appear in this chapter are based on a study of seventy-one tribes by Leo W. Simmons (1945) For a comparison of preliterate societies with our own that furnishes much of the framework for this chapter, see Howard E Jensen (1957)

entity which far from having been accumulated once and for all in some past era is continually being created Because the scientists are in the forefront of this creation it is they rather than the aged who are looked up to as disseminators of wisdom

2. The magical and religious functions of the aged have largely been taken over by professionally trained religious leaders Furthermore the position of elders is not bolstered by a system of ancestor worship or a fear of ancestral ghosts

3 The policy making function of the aged has remained intact to a considerable degree In the political sphere, elderly persons have at least an opportunity to participate in the election of officials, and many individuals of advanced age hold key positions in government. The complexity of government however, has increased to such an extent that the individual voter is far removed from the actual locus of decision making and therefore loses much of the feeling of power obtained when personal influence operates close at hand.

4 The role of the aged within the family has been drastically curtailed Not only are aged parents generally separated from their children often by considerable distances but they retain little or no authority over their offspring once they have set up an independent household In addition the task of educating grandchildren lies now largely in the hands of parents and professional teachers

5 With rare exceptions the long experience and skill of the craftsman are no longer useful to society Our present techniques of mass production depend chiefly on machinery and the highly developed skills of the true craftsman are generally no longer in demand

6 Entertainment also has become a specialized function and the aged generally play a minor role in this sphere

7 The aged generally play a minimal part in furnishing auxiliary services both in the household and in the economic life of the society The functions that aged parents perform for their married children are limited by the pattern of spatial separation between parents and married offspring Many of the auxiliary services once performed by the aged have now been given over to the very young

This detailed comparison reveals on the one hand a picture of

In our survey of preliterate societies it was necessary to oversimplify for purposes of brevity I do not wish to convey the impression that the seven groups of functions listed above are performed by all aged individuals in all preliterate societies They are present in different societies to varying degrees, and (pertinent to the hypothesis under consideration) are performed to different degrees by the individuals within a given society As a rule, however, those individuals who are no longer able to perform services—even the easier auxiliary ones—generally receive a much smaller proportion of available rewards than their more active peers Furthermore, even among those aged who are physically fit, the highest rewards usually go to those who have specialized in providing the services most valued by the society

The typical pattern, then, is one in which there exists a wide variety of functions that can be fulfilled by all but the most infirm aged, and in which the aged are rewarded, depending upon the values attached to their services, in terms of material goods and prestige This does not result in a completely idyllic situation for each and every elderly person, but it generally does permit the vast majority of old people to continue living useful lives when their physical capacities diminish, and to continue receiving recognition from their compatriots

THE CASE OF AMERICAN SOCIETY*

The contrast between the position of the aged in modern American society and their situation in preliterate societies is readily apparent The full scope of this contrast, however, can be understood only by comparing the functions fulfilled and the rewards received by elderly persons in the United States and those in preliterate societies

1 The existence of a written language de-emphasizes the role of human memory in passing on knowledge from one generation to the next Furthermore, the amount and complexity of accumulated knowledge has grown to such dimensions that it would be impossible for any one individual to have complete mastery of even a small proportion of it Finally, knowledge is regarded as a dynamic

* For a detailed discussion of the position of the aged in literate societies other than our own, see S N Eisenstadt (1956)

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This detailed comparison reveals on the one hand, a picture of

a society where the aged fulfill a variety of important functions, and on the other a society where there exists a minimum of vital functions that the aged perform The explanation for this dearth of functions in American society is a complex one It must take into account the effect of the tremendous change in our economy indicated by such terms as "industrial revolution," "scientific revolution," "mass production," bureaucratization," and "specialization" Fitting into our economic system, we have a system of societal values emphasizing such goals as achievement, success, activity, work, efficiency, practicability, material comfort, progress, and scientific or secular rationality (Williams, 1952) The orientation of our society tends to be the very opposite of that in a traditionalistic society, which looks back at customary ways of solving problems to derive answers for the present We generally look to the future more than to the past and often accept a new idea or object, not because of any intrinsic superiority over the old, but because of its very newness

Our brief study of preliterate societies has made it apparent that societal rewards tend to be associated with functions performed, and our own society is no exception It would, of course, be unfair to make economic comparisons between the aged in our society, with its very high standard of living, and aged individuals in preliterate societies In relative terms, however, our older citizens are generally an economically depressed group One factor that places a still greater burden on them is the long continued decline in the purchasing power of the dollar, which decreases the real value of their savings A burden that is, perhaps, harder to bear than the economic one is the low prestige our society accords them It is the young, the strong, the beautiful who receive the nation's adulation

Those aged individuals who continue to perform key functions are in a different situation from their more numerous peers who receive rewards commensurate with social uselessness The former group generally receives more recognition and as a result, seems to be better satisfied with life and better adjusted than the latter

Another important factor in the impact of aging on an individual is closely related to the performance or nonperformance of functions We have often heard the trite saying, 'You are as old as you feel" Preliminary evidence indicates that, regardless of his actual chronologic age, a person's general adjustment to aging is pro-

foundly affected by his feeling about his age that is, whether or not he feels old (Phillips, 1957) Individuals over 70 who identify themselves as "middle aged" often seem to be better adjusted than individuals between 60 and 70 who consider themselves "old" or "elderly" Similarly, age identification seems to counteract the effect of certain major role changes, such as those brought on by retirement or the death of a spouse Those who are retired and still identify themselves as "middle aged," for example, are frequently better adjusted than employed persons who think of themselves as "old" or "elderly"

This effect of age identification on the adjustment of elderly people shows how the low status of the aged in our society operates on the individual To identify oneself as "old" is to accept a low cultural evaluation, the aging person who thinks of himself as merely "middle aged" is able to a large extent to avoid the negative evaluation The self image that the senescent individual adopts can have definite consequences for his personal adjustment

IMPLICATIONS

If the above analysis is correct, then the impact of aging is harder to bear where the opportunities for performing functions valued by society are limited and easier where such opportunities are plentiful. For those concerned with improving the situation of the aged in our society, this is an important point on which to base either limited approaches to the problem or a general approach Much can be done without any major changes in societal structure or values, while we look for more basic changes that might provide a solution

One circumscribed approach is to encourage the formation of "golden age clubs," where people of advanced years come together for social or recreational purposes In situations where the alternative would be little or no social activity for older citizens, such programs provide a definite step forward Membership in such organizations, however probably hastens the identification of one self as "old," a factor that seems to be closely related to maladjustment Furthermore, the resultant segregation of elderly people from the rest of the community may decrease opportunities for them to perform valuable functions

An analogous argument may be advanced concerning the estab-

lishment of segregated communities for the aged While such developments may provide the very best housing, medical, and recreational facilities, the isolation from functions normal to a mixed community may prove deleterious

Older people are frequently advised to take up a "hobby" For an individual who has retired after a life of single minded devotion to his occupation and who, as a result, has few, if any, outside interests, this advice may be difficult to follow The value of such hobbies would probably vary with the degree to which they represent a genuine investment of the individual's interests, as well as the degree to which they are socially regarded as having some useful function

The effectiveness of advice to postpone retirement as long as possible also would probably vary with the individual Many who want to continue working are prevented from doing so by inflexible retirement policies and equally inflexible employment policies Many who finally do obtain employment after being retired have to accept jobs that either are not personally satisfying or do not confer social prestige

The increase in range of coverage and amount of benefits paid by Old Age and Survivors Insurance, as well as by private pension plans, should help reduce the economic impact of aging It remains to be determined, however, how much this increase will be nullified by inflation

The effectiveness of each of these limited approaches to the problem of aging can vary greatly in different situations, and for this reason the proper approach for each individual would have to be determined separately

With respect to a more general solution it is much easier to suggest goals to strive for than to devise specific means whereby such goals may be achieved A discussion of such means would necessitate a far more detailed treatment than can be afforded in this chapter

What seems to be needed is a social climate in which the aged are first class citizens, where they perform functions that are socially valued, and where they are recognized as important to society The opportunities for performing such functions can be increased by such techniques as doing away with compulsory retirement systems not based on ability, and providing the type of housing that inte

grates the aged with the rest of the community. However, a complete recognition of the worth of the aged probably could not be accomplished by such methods alone . . the Amer- . measurable

— intrinsic worth and merit A retired worker who by present standards is viewed as piddling away his time on some foolish hobby might be regarded, on the basis of values stressing individual personality, as working toward a most worthwhile societal goal· the enrichment of his own life and the lives of others by bringing some of his latent capacities to fruition Such a change in attitude would have to involve a modification of the emphasis placed on economic achievement as the major means of gaining societal recognition and a feeling of personal usefulness

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or [illegible]

ular exercise is des[illegible] their physical fitness Some tion but that individuals vary greatly in their physical fitness Some at 70 can exercise more strenuously than others at 40 The oldster should be encouraged to exercise within his ability While it is true that the exercise tolerance can be gradually increased, attempts to increase it too rapidly may be dangerous A sensation of pleasant fatigue, and not that of exhaustion, should be the goal It is hardly necessary to say that a careful physical examination should precede advice about the kind and amount of exercise to be taken

Patients of any age need to be reminded that exercise should be taken regularly instead of spasmodically Like the biblical manna in the wilderness, exercise cannot be hoarded Thirty-six holes of golf once a week cannot be as effective as comparatively brief periods of exercise taken regularly

Doctors should encourage their patients to select a form of exercise that they will really enjoy, and to be content with an activity that suits their age and physical condition While a doctor cannot and should not dictate to his older patients the form of exercise they should take he may tactfully point out that sports and physical activities may be graded into categories of decreasing stress and that one should use judgment in keeping within his exercise tolerance Patients past middle age should be warned against taking golf and other competitive sports too seriously A professional must have a strong competitive spirit to succeed, but most players are amateurs who should make golf a game instead of a business

People who do not enjoy walking or some other activity enough to obtain regular outdoor exercise should be encouraged to take calisthenics regularly Dr Walter McClellan (1957) of the University of North Carolina has said that the one exercise which he considers most beneficial is regular deep breathing It raises shoulders and chest, improving our posture and our sense of well-being

CHAPTER 26

Helping the Older Patient Adjust to Age

WINGATE M. JOHNSON

One of the family doctor's most important functions is to help his older patients make the necessary adjustments to age. These adjustments are at least threefold physical, socioeconomic, and psychologic The socioeconomic adjustments have been the subject of an earlier chapter, but it is hard to separate them entirely from the physical and psychologic adjustments of the older person, to which this chapter is chiefly devoted Many of the necessary physical adjustments have been discussed in previous chapters The need for properly fitted glasses and possibly for hearing aids, the value of a balanced diet and adequate weight control, and the importance of periodic physical examinations have all been emphasized The need for adequate exercise has been mentioned more than once, but is important enough to deserve further emphasis

STRESSING THE VALUE OF EXERCISE

Dr Paul White (1957), who teaches by example as well as by precept, gives the following benefits of exercise

1 It maintains good tone in the muscles, including the heart muscle This, in turn, improves the circulation, and helps prevent varicosities in the lower extremities

2 It relieves nervous tension

3 It aids the digestion by reducing nervous tension

4 It helps control obesity

5 By deepening the respiration it improves the function of the lungs

As Dr Grollman has pointed out in Chapter 20, osteoporosis even after the menopause may be due more to lessened activity than to hormonal influences The rapid demineralization of bone observed even in younger patients who are kept in bed for more than a week [illegible] ground for this belief

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Patients of any age need to be reminded that exercise should be taken regularly instead of spasmodically Like the biblical manna in the wilderness, exercise cannot be hoarded. Thirty-six holes of golf once a week cannot be as effective as comparatively brief periods of exercise taken regularly

Doctors should encourage their patients to select a form of exercise that they will really enjoy, and to be content with an activity that suits their age and physical condition While a doctor cannot and should not dictate to his older patients the form of exercise they should take, he may tactfully point out that sports and physical activities may be graded into categories of decreasing stress and that one should use judgment in keeping within his exercise tolerance Patients past middle age should be warned against taking golf and other competitive sports too seriously A professional must have a strong competitive spirit to succeed, but most players are amateurs who should make golf a game instead of a business

People who do not enjoy walking or some other activity enough to obtain regular outdoor exercise should be encouraged to take calisthenics regularly Dr Walter McClellan (1957) of the University of North Carolina has said that the one exercise which he considers most beneficial is regular deep breathing 'It raises shoulders and chest, improving our posture and our sense of well-being

It helps to return the venous blood to the heart, fills more of the lung alveoli with air, and results in improved oxygenation of the blood This exercise can be done in any place and at any time and so has a wide applicability for many people. It, therefore, has both psychologic and physiologic effects when practiced"

Some patients would like to perform their calisthenics the first thing upon arising, but find that, although the spirit is willing, the flesh is weak Dr McCloy (1957) of the State University of Iowa recommends that such people begin their exercises before getting out of bed "One often wishes to exercise in the morning, it is convenient, he is undressed, and he does not need to go someplace to exercise later in the day or to exercise at night when he is tired before going to bed, when it might also awaken him too much However, most people upon arising in the morning, feel extremely unwilling to exercise" After a night's sleep there is more of the blood in the general circulation and less in the brain Exercise in bed stimulates the circulation and helps get the individual wider awake Then when he gets out of bed he feels more like doing the rest of the exercises

For people who enjoy the outdoors and are willing to give more time to exercise, a brisk walk in the open air, combined with deep breathing, is probably more valuable than calisthenics Patients of all ages should be encouraged to walk as much as possible in the course of their day's activities, avoiding taxicabs and elevators whenever feasible An office worker who spends most of his time at his desk—especially an executive with many problems to face—feels tired at the end of the day His inclination is usually to lie down and rest before dinner In most instances, however, a brisk walk or some other form of exercise will relax him more than a nap The excess adrenalin formed in response to the stress of the day's problems is used up by exercising the voluntary muscles, and the adrenalin-produced tension is relieved through the mediation of the autonomic nervous system Digestion is better and sleep sounder after exercise

The value of exercise is greatly augmented by good posture, and habit plays an important part in posture Patients who have cultivated the habit of standing erect, with the breast bone elevated and the pelvis properly aligned, are far less prone to backache and other "miseries" attendant upon middle age in patients with habitually poor posture.

HELPING THE PATIENT TO FIND RECREATION

Recreation is defined by Webster as "Diversion play relaxation" *Diversion* in turn is defined as A turning aside from a course plan and so forth (2) amusement" *While exercise and recreation may* often be advantageously combined there are many *types of recreation that do not require physical exertion Hobbies—interests out*side one s daily occupation—should be cultivated *long before the* retirement age is reached The doctor can be of great *help to his* older patients by learning what extracurricular activities they enjoy encouraging them to cultivate the best ones *and possibly suggesting others* that they might take up Depending on the *patient s* tastes and physical condition these might range from such sedentary occupations as reading writing and stamp collecting to more active pursuits such as cabinet making, gardening and raising chickens Many hobbies can be turned to profit as well as pleasure

Hobbies are more fun if shared with others Many communities have clubs whose members are bound by the common interest of a hobby or hobbies Garden clubs sewing circles bridge clubs and other such groups are truly mutual benefit organizations In many places community projects include classes in painting needlework and other arts and crafts Not many of our patients can emulate Grandma Moses but many mature men and women have learned new skills that afford them satisfaction and often some of the recognition that means so much to old people

MEETING THE PROBLEM OF RETIREMENT

The older person s psychologic adjustments to age may be more difficult than his physical adjustments The understanding physician can often be of great help but it is necessary for him to recognize the problems facing the old man or woman One of the greatest of these is retirement with all the psychologic and socioeconomic adjustments that it brings

Many of the most unpleasant traits of adolescence and of old age have a common basis as expressed by Stuart Chase in *The Road We Are Traveling* "Men want to *belong* to feel that they are a part of a living community that they have a place in it which other people recognize" The adolescent s desire to be recognized as having a place in society makes him "throw his weight around" and

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eached, and that government grants to support this growing group of retired workers could not go on increasing to astronomical levels.

Some industries are modifying their retirement policies The R. J. Reynolds Tobacco Company, for example, has recently increased its compulsory retirement age from 65 to 70, but leaves it optional with the employee to retire voluntarily at 65 The retirement benefits are the same at either age In North Carolina the Governor's Coordinating Committee on Aging has prepared for distribution to employer groups a four page brochure entitled "A New Look at the Mature Worker" This pamphlet gives convincing arguments for employing older workers

In spite of the increasing opposition to a rigid compulsory retirement age, however, it appears that most employees will be subject to it for some years to come As a citizen, the doctor should use his influence to protest the arbitrary custom of requiring a man to give up his work at a fixed age, regardless of his physical and mental fitness As a physician, however, he must help his older patients meet the changes that retirement brings in their lives While he should encourage his patients nearing the retirement age to take advantage of the preretirement counseling offered by some concerns, it is much more important for him to help his individual patients over this major crisis in their lives

ACCEPTANCE OF ALTERED LIVING CONDITIONS

Often associated with retirement is the necessity of living on a reduced income Fortunately, most people who have reached the retirement age are able to lower living expenses in many ways Their children are usually financially independent, and in most cases have left the home nest and are living in their own quarters Although it is not easy for an elderly couple to leave the home in which they have brought up their family, most older people can eventually make the adjustment to a smaller house or an apartment Another alternative is to convert part of the family home into rooms or apartments for rent

The adjustment to widowhood, which must be made by many aging men and women, is of course the hardest of all In old age it usually brings not only bereavement, but a change in status and in living conditions often greater than that associated with retirement

speak with authority on various subjects, whether his opinion is asked for or not The older person, on the other hand, wants to *continue* to belong, and consciously or subconsciously resents being pushed aside The prevailing custom of enforcing a rigid compulsory retirement age is often responsible for bitter resentment, and may precipitate a mental depression From the psychologic as well as the socioeconomic point of view, retirement is one of the greatest problems the aging person must face The doctor who is himself able to keep at work when long past the customary retirement age should not forget that relatively few of his nonprofessional contemporaries are so fortunate

It seems paradoxical that as the proportion of older people in the population has increased tremendously within this century, most of them have been deprived of the privilege of working after they have reached an arbitrary age limit, or of securing employment after the age of 40 Yet it has been proved repeatedly that most people are quite capable of doing productive work when well past the traditional retirement age of 65 The steadily increasing proportion of older people in the population means that the custom of retirement at a fixed age entails a tremendous waste of manpower The Sun Life Insurance Company has estimated that by 1970, if the present trend continues, as many of the adult population will be on pension as at work Then every worker will have to support a nonworker, directly or indirectly

There are some encouraging signs that the folly of continuing this policy is being recognized In the first National Conference on Aging, held in Washington in August, 1950, eight of the eleven sections went on record as opposing the fixed retirement age More recently Dr H B Mulholland, chairman of the American Medical Association's Committee on Aging, expressed the committee's opinion when he said "The average age of retirement has been set at around 65 for labor, industry, and educational institutions many individuals are perfectly capable of making an important contribution to whatever position they hold, at this time of life Indeed, their wisdom and skills are oftentimes ripened into maturity To cope with this problem, there must be a realization that retirement age should be physiologic rather than chronologic" Dr Mulholland went on to say that only one in 25 employees wished to retire when the arbitrary retirement age was

American Psychological Association held in September, 1957, Dr John E Anderson professor of psychology at the University of Minnesota stated that a poll of representative groups of older and younger people showed that at least 75 per cent of people past 65 preferred separate living quarters and that the same proportion of younger people shared this view

If it is actually necessary for a young couple to take an elderly relative into the home it should be understood at the very beginning that he (or she) is not to be a petty tyrant On the other hand he should not be made to feel helpless by too much attention or "bossing" but should be allowed to do for himself as much as he is able As long as he can get about it is well to assign him some task or tasks that will give him a feeling of usefulness

Much has been written and said recently about the need for special housing facilities for older people Retirement villages" a term somewhat suggestive of concentration camps seem to be especially favored There is danger that, in typical American fashion, this idea may be carried too far Statistics show that 70 per cent of the population over 65 own their own homes 25 per cent live with relatives or other families and only 5 per cent live in institutions (nursing homes or hospitals) Edna Nicholson in her excellent discussion of the housing needs of older people (1957) said that "At least 75 to 80 per cent of all persons 65 years of age and over in the United States are entirely able to live independently in ordinary houses and apartments throughout the community" It was her belief that too much emphasis has been placed on the need for special housing "Older people should remain independent active integral parts of normal community life as long as possible [They] want to choose their own living arrangements and usually they greatly prefer to remain in the homes and neighborhoods where they have been living and where they have friends relatives and familiar surroundings Comparatively few people have any desire to leave their own neighborhoods and move to colonies or projects inhabited exclusively by people their own age" She then made the point that Good housing units suited to the needs of the entire population will meet the requirements of healthy people past the age of 65 along with those of everyone else"

There is however a real need for suitable nursing homes for

The understanding physician can be a great aid to the bereaved one, especially if he has for years been the family doctor and so is regarded as a sort of honorary member of the family If the final illness was short—a massive stroke or a coronary occlusion—he can emphasize the fact that the loved one was spared the suffering of a lingering illness On the other hand, after a long period of disability, especially if the patient suffers pain or is mentally affected, death may be a welcome relief

Time is a great healer, and should be allowed to exert its soothing effect Too many people try to keep their grief alive, watering it with tears as one would a plant They feel disloyal to the loved one's memory if they forget the loss, even for a short time A physician may point out that such an attitude is really selfish, that the departed mate would not want his wife (or husband) to suffer, and that the survivor owes it to his children and friends to take up his normal activities, so far as is possible

The physician can often encourage the feeling, which comes naturally to many people after the death of a life's companion that the loved one is not far away After a couple have lived together for many years, each one knows so well what the other would do or say under given conditions that the one who is left can almost hear the other's voice

The older person may be consoled by a reminder of his good fortune in having had so many years of marriage And he should be able to say with the aging Cato I found my own consolation in the thought that the parting and separation between us was not to be for long"

The family doctor has a peculiar advantage in being able to see the viewpoints of both the older and the younger generations and of being in a position to talk frankly to both He can often give helpful advice about dealing with a widowed parent or grandparent, and can suggest arrangements that might be preferable to taking such an elderly relative into the home Whenever feasible it is usually better for older people to live apart from their children and grandchildren, either in their own homes apartments or rooms, or in nursing homes While in some cases the presence of an elderly parent or grandparent in the home may be a real benediction, only too often the opposite is true At a joint conference of the American Medical Association's Committee on Aging and the

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almost a million older people To quote Miss Nicholson again, we need 'homes for people who have continuing infirmities and illness, who require good care in varying amounts but do not need the highly specialized equipment, personnel and routines of general hospital wards, who are not able to maintain homes of their own, and who do not have families and friends with whom they can, and want to, live and receive care"

Many such homes are kept up by church groups, others by fraternal organizations, such as the Masons, others by private citizens, often middle aged or elderly nurses, and still others are community-sponsored Such nursing homes should be inspected by competent observers, and only the ones that meet reasonable requirements should be given permission to operate This is a natural function of state or city welfare departments It is desirable that such homes for the aged have access to the facilities of general hospitals for the treatment of medical or surgical emergencies, and that the services of a physician be available when needed

When the doctor is in a position to advise younger relatives of an elderly patient who lives in his own quarters or in a nursing home, he should encourage them to make frequent visits to the home, to take the older person to church or other gatherings and to have him for occasional meals with the family All these attentions help to dispel loneliness, and to keep the elderly relative from becoming withdrawn and egocentric

FACING FEARS ABOUT OLD AGE

The physician who really desires to understand the viewpoint of his older patients should read and study Cicero's classic essay on old age, 'De Senectute' This essay gives four reasons for men's dread of old age "First, that it withdraws us from active employment, second, that it enfeebles the body, third that it deprives us of nearly all physical pleasures, fourth, that it is the next step to death" The first reason has already been discussed in the section on retirement If Cicero were living today, he would oppose compulsory retirement for men whose jobs do not demand great physical strength 'Old men retain their intellect well enough if only they keep their minds active and fully employed The great affairs of life are not performed by physical strength or activity, or nimble-

ress of body, but by deliberation, character, expression of opinion Of these old age is not only not deprived, but, as a rule, has them in a greater degree"

The second drawback of age, that it enfeebles the body, Cicero dismisses rather curtly with an elaboration of the thought, "Bodily strength is wanting in old age, but neither is bodily strength demanded from old men"

The third reason for dreading old age, that it deprives us of nearly all physical pleasures, Cicero regards as a cause for thanksgiving "No more deadly curse than sensual pleasure has been inflicted on mankind by nature Intellect is the best gift of nature or God to this divine gift and endowment there is nothing so inimical as pleasure" Then, however, the noble old Roman proceeds to prove that there are higher forms of delight left for the last years and that "old age does enjoy itself well enough"

FEAR OF DEATH

Death is not nearly as gruesome a subject to the old as it seems [illegible]

When the topic of death came up toward the end of a discussion period he quickly changed the subject thinking it would be too depressing for them They brought up the question again at the beginning of the next session however, and asked to keep on talking about it Because many older people do want to discuss it, the doctor should have some clear cut opinions about death

Old people who have an unreasonable fear of death may be reminded that they have achieved what the young can only hope for "The one wishes to live long the other has lived long" (Cicero) The physician who has witnessed death again and again can often bring comfort to fearful patients by testifying that there is no reason to dread the actual process of dying Almost always death brings its own anesthetic, which is usually effective for a period of time varying from a few hours to days or even months With a very few exceptions, dying is like going to sleep The exceptions to this rule are almost never in old people

The physician should not be afraid to tell his patients of the

comfort he derives from his belief in another Life after the earthly one is ended. The dread of death is certainly lessened if one can believe, with the pagans Plato and Cicero, in the Christian doctrine of personal immortality. Patients who cannot accept such a belief on faith alone should be encouraged to read Cicero's reasons for holding it. One of the best of his arguments is as follows: "But if I am wrong in thinking the human soul immortal, I am glad to be wrong, nor will I allow the mistake which gives me so much pleasure to be wrested from me so long as I live. But if when dead, as some insignificant philosophers think, I am to be without sensation, I am not afraid of dead philosophers deriding my errors."

DEVELOPING A SOUND PHILOSOPHY FOR THE LATER YEARS

In helping old people make a sound psychologic adjustment to age, the doctor has the invaluable assistance of Nature's beneficent provision that one's viewpoint changes with advancing years. Except possibly at the climacteric, adjustments to increasing age levels are made so gradually as to be almost imperceptible. In Chapter 25, Dr. Phillips has given an excellent argument for encouraging our aging patients to think of themselves as being mature rather than old. "A person's general adjustment to aging is profoundly affected by his feeling about his age. . . . Individuals over 70 who identify themselves as 'middle-aged' often seem to be better adjusted than individuals between 60 and 70 who consider themselves 'old' or 'elderly.'"

Some years ago I formulated for my own use seven "rules of conduct" for adjusting to age. I have found that some or all of them can be used to advantage in helping my older patients and friends to accept old age with a reasonable degree of complacency. These rules—or suggestions—are as follows:

1. Recognize that the mind should be at its best at 40, and should continue to be efficient to the age of 70 or more. The pathologists have shown that organic changes in the brain do not necessarily parallel mental changes. If properly trained, the mind does not lose its elasticity, and constant use of the brain helps keep it efficient. Stieglitz (1951) has expressed the consoling thought that wisdom depends upon experience, in which time is a factor.

2. Avoid becoming an old fogy by associating frequently with young people Prepare for occasional shocks, but try to understand their viewpoint

3 Learn to delegate authority and to unload responsibility upon younger shoulders There is an advantage in partnerships in which the enthusiasm of youth is balanced by the judgment of maturity.

4. Cultivate wide interests Learn new uses for the hands and brain, and exchange more strenuous amusements for others less exciting To quote A. C Benson (1906), "One ought to grow older in a tranquil and appropriate way to be perfectly contented with one's time of life . . amusements and pursuits ought to alter naturally and easily, and not be regretfully abandoned"

5 Keep in touch with old friends and make new ones Dr Samuel Johnson once said, "If a man does not make new acquaintances as he advances through life, he will soon find himself alone A man, sir, should keep his friendship in a constant repair"

6 Cultivate equanimity—the mental poise that keeps one from being unduly elated by good fortune or depressed by bad news, and that teaches one to take fortune's buffets and rewards with equal thanks This suggestion does not mean that one should become indifferent or lose enthusiasm, which has been defined as the motive power of progress It is important to keep a proper balance between emotion, which furnishes the driving power for the human machine, and reason, which corresponds to the steering gear and the brakes I know of no better way to acquire this balance than to adopt Osler's *Way of Life* (1940), learning to live 'in day-tight compartments"

7 Finally, cultivate the habit of looking forward rather than backward. This advice may seem to conflict with Osler's admonition to live one day at a time, but it really does not Planning for tomorrow is often part of today's task, but sighing over yesterday accomplishes nothing The greatest bore in all literature must have been Coleridge's "Ancient Mariner," who with his skinny hand kept a guest away from a wedding feast while he told an interminable tale of a shipwreck suffered in his youth Even though it is difficult, one should always be ready to exchange outmoded ideas for new and better ones

Since personal experience is always more convincing than mere theorizing aging patients may be comforted by the testimony of

two philosophers who lived centuries apart More than 2,000 years ago Plato quoted the reply of the aged Cephalus to the question, "Is life harder towards the end, or what report do you give of it?" "Old age has a great sense of calm and freedom, when the passions relax their hold, then . we are freed not of one mad master only, but of many . He who is of a calm and happy nature will hardly feel the pressure of age, but to him who is of an opposite disposition youth and age are equally a burden"

The other philosopher is Dr Francis M Pottenger, who in the final chapter of his autobiography (1952) said 'My 80 years do not worry me To be sure, I would like again to have the keenness of youth On the other hand, I would miss the mellowness of age, the store of experience which guides me in my every movement and act I have tried not to live too much in the past, but to be alert to the problems of the future Thus I have accepted as an antidote to aging It does not prevent the years from rolling by , but it does prevent that fear of the future which otherwise might make one unhappy in the twilight of life"

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